Museum Library

Old Series Vol. X | CONTINUATION OF THE BULLETIN OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION | New Series Vol. V

BIRD-BANDING

A Journal of Ornithological Investigation

Vol. V October, 1934 No. 4

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

CONTENTS

Page

THE OPERATION OF HOMING INSTINCT. By *Frederick C. Lincoln* . 149

THE STATUS OF CAPE COD TERNS IN 1934. 2 Figures. By *Oliver L. Austin, M. D.* 155

EASTERN FIELD SPARROW MIGRATION IN TENNESSEE. By *Amelia R. Laskey* 172

THE DISTRIBUTION OF MICHIGAN RECOVERED EASTERN EVENING GROSBEAKS NEAR THE ATLANTIC SEABOARD. 1 Figure. By *M. J. Magee* 175

A MIGRATION STUDY OF CATBIRDS FROM 1929 TO 1934. *By Geoffrey Gill* 182

GENERAL NOTES.—Bird Banding in the Antarctica, 187; Sex Ratio in the House Sparrow, 188; Herring Gull Recovery from Panama, 189; A Few Herring Gull Recoveries, 189; Winter Banding at Concord, New Hampshire, 190; A Least Fly-catcher Return-1, 191; A Second Pine Warbler Return, 191; Longevity of Brown Thrashers, 191; Homing Instinct in the Florida Red-wing, 192; Notes on Cape Cod Crow Movements, 192; A Rose-breasted Grosbeak Returning Ratio, 193; Breeding Birds Successful Despite *Protocalliphora*, 194; Additional Plumage Color Changes of the Eastern Purple Finch, B69309, 194.

RECENT LITERATURE. Banding Papers, 195; The Sex Ratio of Ducks, 195; Migration, 196; Banding in Hungary, 196; Migration Theories, 197; Ecology, 198; Censuses, 199; Longevity, 200; Weight, 200; Life History Studies, 201; Territory, 202; Bird Behavior, 203; Cooperative Ornithology, 204; References and Abstracts, 204.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. V. OCTOBER, 1934 No. 4

THE OPERATION OF HOMING INSTINCT

By FREDERICK C. LINCOLN

Biologist, U. S. Biological Survey

THE operation of the faculty known as "homing instinct" is not well understood. The term itself has long been loosely used although generally it is applied chiefly to that ability possessed to a greater or lesser degree by most forms of animal life and which enables them to return from a distance to their "homes." Among domestic animals it is probably best exemplified by the homing pigeon and the so-called domestic cat. Reduced to its simplest terms it appears to be nothing more nor less than a "sense of direction" and, accordingly, is the same sense or instinct that guides migratory birds with such unerring accuracy to their summer and winter quarters. The nervous seat of this "sense" is still unknown.

With this brief but definitive background concerning the meaning of the term, it is of more than passing interest to find that it has a most practical application in any plans that are considered for the restoration of depleted areas with migratory game birds.

Many persons appear to believe that it is necessary only to introduce a few pairs of birds of any particular species into an area that is environmentally suitable and—Presto! the species is established and, allowing for the natural mortality from all causes, will multiply to the full carrying capacity of the area. This belief undoubtedly has its basis in the success that has attended the introduction or transplantation of a few species of upland game and some song birds. Of these, the best known examples are the Ring-necked Pheasant (*Phasianus colchicus*), the Hungarian Partridge (*Perdix perdix*),the Bob-white Quail (*Colinus virginianus*), the English Sparrow (*Passer domesticus*), and the European Starling (*Sturnus vulgaris*). On various occasions other species on both the song-bird and the game-bird lists have been introduced or transplanted with passing success, but it should be noted that, almost without exception,

the experiments that have been successful or partially successful have been made with non-migratory species. It is true that the European Starling is migratory to some extent in its native habitat, and it is interesting to observe that, although for several years after its introduction into Central Park, New York City, in 1890 and 1891, it appeared to be strictly sedentary, it has since spread over a wide expanse of country, and banding data demonstrate that it now seems to be developing migratory habits comparable with the seasonal movements of the species in Europe.

An historic attempt to introduce an Old World migratory species in North America is the case of the Migratory Egyptian Quail (*Coturnix c. coturnix*), of which several thousand were imported and liberated in the Northeastern States during the period 1870 to 1880. There seems to be no doubt that some of these birds actually nested and raised broods during their first season, but when the time came for their regular autumnal migration, they departed southward and there is no evidence that any of them returned the following spring. Similarly, attempts to introduce the closely related Migratory Chinese Quail (*Coturnix c. japonica*) into the State of Washington were made first in 1904 and again in 1923, but the bird did not take hold and soon disappeared. While, of course, it is not intended to imply that these birds migrated back to their natural winter quarters in Africa, it is possible that they may have attempted the feat and so perished at sea. In November, 1877, some Egyptian Quail were reported to have come on board a ship several hundred miles southeast of Cape Hatteras, North Carolina, and this at least lends color to the probability of their destruction at sea.[1]

As stated above, almost all transplantation activities with native North American birds have been with a few different gallinaceous species, including quails, grouse, turkeys, etc. In the strict sense of the term these species are non-migratory as the movements of certain grouse and quail are not comparable with the true seasonal travels of the migratory birds. In recent years attempts have been made to transplant the Black Duck (*Anas rubripes*) into California, but the success of the experiment is not yet known. It is the opinion of the author this will prove a waste of time and money since, even if the transplanted Black Ducks do not attempt to return to their native habitat, they are almost sure to hybridize with

[1]Phillips, John C. Wild Birds Introduced or Transplanted in North America. Tech. Bull. 61, U. S. Dept. Agri., 1928, p. 28.

the closely related and abundant Mallards (*Anas platyrhynchos*), and within a few generations this continued cross-breeding will result in complete submergence of the Black Duck blood, at least in so far as general characters are concerned.

There is, however, much additional evidence that migratory birds have a strong attachment for the breeding site of the preceding season and for their accustomed winter quarters. Attachment to breeding ground involves only the adult birds, as it appears to be demonstrable that, generally speaking, homing instinct does not operate intensively in an individual migratory bird until *after* it has first nested, and that the location of the first nest is more or less a matter of chance *anywhere within the natural range of the species*. In other words, it is postulated that the successful breeding of pinioned migratory birds in an area ecologically favorable, but outside the natural breeding range, does not mean that their offspring will migrate and return to their natal area to build their own nests. On the contrary, the chances seem to be all against this, as there is very little evidence of young migratory birds returning to the area where they were hatched. An interesting exception is the case of a hen European Teal raised on Wenham Lake, Massachusetts, from captive parents. According to Phillips[2] this bird left its natal area on December 6, 1910, and returned on April 19, 1911. Remaining on Wenham Lake throughout that summer, it again departed on December 31, 1911, and returned for the second time on April 18, 1912.

A classic illustration of the return of an adult duck to its nest site of the previous year is the Mallard that carries Biological Survey band 555414. Banded in November, 1927, at a game refuge near Antioch, Nebraska, this duck has returned every year since and has occupied the same nesting site, which, curiously enough, is a box on the roof of a barn.[3] This bird is known to have produced more than one hundred ducklings, many of which have been banded. Thus far there has been no evidence that a single one of these young birds has returned to nest even in the State where it was hatched, though individuals of the broods have been recovered south to Arizona, Texas, and Louisiana, and north to Alberta. While only one record is available from the last-named

[2]Phillips, John C., *The Auk*, vol. 28, 1911, p. 366; and vol. 29, 1912, p. 535.

[3]This duck returned to the refuge on February 4, 1934 and remained all summer but failed to breed. In 1933 she produced a complete set of "runt" eggs which apparently marked the final effort of her ovaries. See *The Condor*, vol. 36, March, 1934, pp. 86-87.

Province, it is rather significant, since it pertains to a bird banded in October, 1928, and recovered in April, 1929, and was unquestionably a breeding bird at the time it was recaptured.

The case of these Nebraska Mallards is paralleled many times among the song birds. In fact, banding data are proving the general accuracy of the popular fancy that assumes that the same Robins, Bluebirds, and other species, return to reoccupy their nesting sites of the previous season. Though both members of the pair may not be the same, one of them is more than likely to be one of the adults of the last season, and its mate is *not* likely to be one of its own offspring.

At the Baldwin Bird Research Laboratory, at Gates Mills, Ohio, the common House Wren (*Troglodytes aedon*) has been for several years the subject of intensive study. Literally hundreds of adults and fledglings have been banded. The percentage of return of adult birds in successive seasons has been more than 42 per cent and some individuals have long records running over several years. It is, however, a rare occurrence for a young bird to be recaptured in a following season, only seventeen, or 2.6 per cent, of a total of 648 having been retaken at the laboratory. Systematic search through adjoining portions of the Chagrin River Valley, involving the capture of almost all of the wrens over a large area, failed to answer the question: What becomes of the young? While the mortality of the juveniles is admittedly very high, nevertheless it appears that the only tenable answer is that they spread indiscriminately throughout the natural range of the species and that it is pure chance if one should return to the area where hatched. It seems probable that this is but the operation of a natural law to prevent much of the inbreeding that might result were the offspring to return with their parents to the home-site of the previous year.

The occasional return of a young bird to its natal area or even to the exact nest site does not, in the opinion of the author, weaken the argument for the reason that the immature birds of many (if not most) species migrate in company with their elders and this group companionship may continue to some extent during the winter sojourn so that on the ensuing northward journey a yearling bird *might* travel in company with its own parents and it *might* actually mate with one of them. Such cases, however, are governed solely by the law of chance. Colonial birds, as the gulls, terns, and herons, which are more or less gregarious throughout the year, might be expected to furnish the majority of the exceptions and, as shown by band-

ing data, this is exactly the case, although such records are by no means numerous.

The attachment of migratory birds for the areas where they have nested seems also to extend to their winter quarters and, to some degree, to feeding and resting points while on migration. This was suggested several years ago when Baldwin[4], banding non-game birds near Thomasville, Georgia, found that White-throated Sparrows (*Zonotrichia albicollis*) returned to spend successive winters in the exact clump of shrubbery where they had been captured at the time of banding. That is, over a period of eleven years the group of these birds at this site was each year identified with the groups of previous years by the recapture of birds banded on one, two, or even three former years. They were believed to constitute a changing but continuing group, probably from the same general neighborhood in the breeding grounds. The number of birds in the group was naturally more or less variable but most of the losses were seemingly made up by young birds or by other individuals that formed a chance attachment to the group.

The operators of other banding stations have obtained much additional data to substantiate this theory and it seems not unlikely that individual North American birds wintering in tropical countries return to their exact winter quarters with the same fidelity exhibited in their return to their breeding areas. An example of this is presented in the case of six Indigo Buntings (*Passerina cyanea*) banded at Uaxactun, Peten, Guatemala, in April 1931, and which were retrapped at the identical spot during the period April 6 to 9, 1932. In the meantime these birds had made the round trip to the United States where (if adult in 1930) they probably had again built their nests in the same area. Another Indigo Bunting (F30330), banded at the same time and place, was not recaptured in 1932, but on April 16, 1933, it was retaken at the banding point.

On New Year's Day, 1926, the author arrived at Crane Lake, Illinois, and erected a banding trap for migratory waterfowl. Nearly 1,000 ducks chiefly Mallards, were caught and banded during the next few days, and in the first catch was one that had been banded only a few miles away, during the winter of 1922.

For many years there has been a waterfowl refuge at Lake

[4]Baldwin, S. Prentiss. Bird-Banding by Means of Systematic Trapping. Abstr. of Proc., Linn. Soc. of N. Y., no. 31, pp. 37 and 43, 1919.

Merritt in the city of Oakland, California, and since 1926 this also has been operated as a banding station. E. W. Ehmann, the Biological Survey coöperator in charge of the work at that point, has banded more than 5,000 ducks, chiefly Pintails (*Dafila acuta*) and Baldpates or Widgeons (*Mareca americana*). In commenting upon his operations in 1933 Mr. Ehmann reported to the Survey that more than 50 percent of the birds trapped in that season had been banded previously at that station, showing conclusively the strength of the attachment and of the guiding instinct that caused these birds—many of which undoubtedly came from breeding grounds north of the Arctic Circle—to make Lake Merritt their focal point for the winter season.

The largest and oldest waterfowl banding station in the United States is that operated at Avery Island, Louisiana, by E. A. McIlhenny. During the past fourteen or fifteen years, nearly 20,000 waterfowl of several species have been banded at this station, and the records of recovery extend from the Atlantic to the Pacific and north into the Sub-arctic region. The breeding grounds of the ducks wintering in the region of the station, are clearly shown north through Canada to Alaska. Nevertheless, during the trapping period of the last season (1933–34) Mr. McIlhenny recaptured 716 ducks banded by him in previous seasons.

In order to test the strength of the homing instinct, Mr. McIlhenny has, in coöperation with the Biological Survey, made several shipments of banded ducks (chiefly Pintails) to prearranged points where they were received and liberated in favorable areas. During the season of 1933–34, banded Pintails were retrapped at Avery Island that in previous seasons had been trapped there, shipped by express, and liberated at Washington, D. C.; Blackwater Migratory Bird Refuge, Cambridge, Maryland; O. L. Austin Ornithological Research Station, North Eastham, Cape Cod, Massachusetts; Berkeley, California; Lake Malheur Migratory Bird Refuge, Voltage, Oregon; and the National Bison Range, Moiese, Montana. Here were groups of birds indigenous to the Mississippi Flyway, which has been forcibly removed and liberated in the Atlantic and in the Pacific Flyways, and in succeeding seasons were found back in their original winter quarters.

Summary and Conclusions—From the data at hand it appears that homing instinct in most migratory birds does not operate until after they have nested for the first time, and that the selection of the first nest-site is fortuitous, anywhere within

the natural range of the species. In the case of the adult bird, however, the homing instinct is a powerful influence operating not only to bring it back to the site of its nest of the preceding year, but even to its original winter quarters and probably to feeding and resting areas while en route.

From the evidence presented it appears unlikely that efforts to restock depleted waterfowl marshes with pinioned or hand-reared ducks will be successful. It is desirable, however, to have further data on this subject, to accomplish which all birds liberated for restocking purposes should be banded, and special efforts should be made to capture and band any young that may result from such liberations. The Biological Survey will be glad to furnish bands and otherwise assist in any operation of this character that may be contemplated.

THE STATUS OF CAPE COD TERNS IN 1934[1]

By OLIVER L. AUSTIN, M.D.

THIS season, the Cape Cod tern colonies have experienced an unprecedented prosperity, surpassing what was thought to have been the cyclic peak of 1929. This was subsequent to the occurrence to an almost ideal degree of the major essential ecological conditions, both natural and artificially controlled, which determine the degree of success of a nesting. The elements and the food-supplying ocean were benignant; reclamation work at the site of the Cape's largest colony, Tern Island, adjuvanted greatly. Notwithstanding this, the opinions advanced by the station's staffs in 1932 and 1933 that the success of all tern colonies is cyclic and that the curve for the Cape's tern population is and will continue to be regressive remain unchanged. During the last four breeding seasons the banding of chicks in all the tern colonies has been sufficiently comprehensive to warrant the use of totals for statistical comparisons. Environmental conditions of natural origin have been practically commensurate for all nestings this year. Since the Tern Island chick-banding comprised this year 76 per cent of the total bandings on the Cape, whereas in the total of the three preceding years they were but 34.3 per cent, the difference must be charged in part to constructive human intervention at Tern Island. The sum of immature bandings for the entire

[1] Contribution No. 18 from the Austin Ornithological Research Station.

Cape, exclusive of Tern Island, this year is 16 less than the average of the three antecedent seasons; what it would have been had Nature been less kind is obvious. It is probable that the auspicious conditions of this season, like the numerically record-breaking land migration which traversed the Cape in the fall of 1932, will not recur soon nor with sufficiently effective regularity. The human assistance, so efficiently important at Tern Island this nesting, is not certain of either inception or accomplishment.

Climatic conditions usually play an essential inhibitory rôle in determining the percentage of survival of a hatching; possibly they are the means utilized by the great biological scheme to curtail excessive reproduction. With yearly regularity, at some moment when hatching has been well advanced, a severe, cold easterly storm of from two to four days duration has occurred to take toll amounting to many hundreds of the low-vitalized chicks. Periods of continuous excessive heat or cold have killed large numbers of the inadequately brooded young, while recurring high winds have augmented the mortality. Each June or July a wind-heightened flood tide has obliterated in a few hours one or more badly sited colonies.

Spring was precocious on Cape Cod this year; early May was unseasonably warm and balmy. Long cloudless and fogless days so stimulated sexual activity that nest-building, egg-laying, and hatching ensued two weeks in advance of the customary dates. Aside from three light showers and one day of intermittent and warm sprinkling, there was no rainfall during the whole breeding season. The wind was consistently light and almost uniformly from the warm southerly and westerly quarters; consequently fog occurred infrequently. There were no cold, raw days and no long periods of excessive heat. All the nights of eleven-foot full-moon tides were so still that no flooding of moment covered extensive nesting areas. For some undiscovered reason, this year, even on the low north end of Tern Island, there was but trivial occupancy of tide-inundated locations.

For the consummation of successful reproduction the constant presence of an adequate and suitable supply of food is of almost as great importance as is suitably tempered weather. Also, this must be within close proximity to the colonies. Tern chicks, like nursing humans, thrive only when given heat-producing and tissue-building nourishment at intervals at least twice as frequent as are requisite to adult welfare. When parent birds must travel long distances to obtain food, or spend much time in catching it, the corresponding hiatus in

brooding, especially in inclement weather, determines consequent fatalities. The great scarcity of all small bait fish near Tern Island in June, 1933, resulted in the death of over fifty per cent of the first hatchings. Many times it has been observed that the combination of food-shortage with inclement days has coincided with an otherwise inexplicable sharp rise in the death rate. In preceding years it has been a common occurrence to find a dead chick, even well grown, with close to its head an evidently proffered fish too large to permit its ingestion. This year, from early May until the first of August, Nature was prodigal with an uninterrupted supply of food in the immediate vicinity of the colonies. The sand-eel (*Ammodytes americanus* DeKay), unquestionably the "staff of life" "and the Piece de Resistance" in the tern dietary, was present overabundantly at all times. In 1933 a motley variety of bait fishes were proffered the female by the male during the courtship dance; this year sand-eels alone were utilized. From the observation blinds on Tern Island it was noted that departing parents usually returned to chicks in a very few minutes with food. This explains another determination—that, although it was less requisite for climatic reasons, the chicks were more closely nursed than during previous nestings.

The degree of food-abundance can be estimated from the numbers of unconsumed fish found in the colonies. Everywhere the totals of these were multiplied many times beyond those of previous years. Since dead chicks commonly have one or more uneaten fish close by, the unprecedentedly low chick mortality this summer should have diminished the discard. During late visits to the islands numerous little piles of fresh sand-eels were found near robust, husky chicks. During the whole season not over twenty-five dead fish other than lance were seen. At Egg Island, where formerly the food consisted largely of small minnows taken from a salt creek a mile away, every visit found a great majority of the adults catching sand-eels close by. Strikingly infrequent were the customary fights of a dozen half-grown for every meal brought to an open space by an adult. Usually so soon as the young have matured sufficiently to fly well, and are being taught to forage for themselves, they depart promptly to thrive on the greater bounty of the outer beaches and sand-bars. All summer these birds lingered at their natal sites. At Tern Island late July found flocks of thousands of them congregated along the shore and feeding themselves far earlier than customarily in the contiguous shallows. The percentage of adults in these groups was surprisingly low.

Predators, by yearly comparisons, accounted for but a trivial part of this year's unapproachably low chick mortality. While the almost perfectly efficient protection given the Tern Island colony is preponderantly responsible for this, of great value was the success of the first nesting by shortening the period of vulnerability. At Tern Island the rats and at Egg Island the owls, in the two preceding years took a many times greater proportionate toll of the second than of the first hatch. The relatively smaller number of gulls on Cape Cod this year, especially Laughing Gulls (*Larus atricilla*), and the almost complete absence of their tracks as well as those of Black-crowned Night Herons (*Nycticorax n. hoactli*) on the sand of nesting sites eliminates the likelihood of destruction of eggs, at least by these suspected, though unconvicted, species.

Human molestation was unexpectedly slight, at least in the three large groups. Monomoy Point, which cannot be credited with having reared a hatch in recent years, and Pamet Point, almost equally unproductive, were being grievously overrun, so we did not visit them. There were but six first nestings on Nauset Point, none on North Point, and no second breedings on either to be thwarted by picnicking summer residents. Friendly quahaugers fishing regularly close to Billingsgate Island brought reports of its being passed by as a recreation ground. On one of our visits, we found spending the day there a large group of a nationality indicted for two former complete vandalisms of the colony, but they evidenced no interest in either the birds or our work. Egg Island, although in the heart of a busy yachting and fishing field, suffered no damage other than one boyish piling of six eggs into a single nest.

For the purpose of obtaining data on returning birds and thus being enabled to utilize the extensive immature bandings of previous years, an effort was made in 1932, and more intensively in 1933, to trap a large number of adults. These were caught to the number of 1239 during the first, and 2,857 in the second year by the most efficient but exceedingly slow method of placing drop traps over nests containing eggs. This necessitated spending long days in the colonies almost consecutively throughout the entire season. Such constant trapping made the birds unusually excited, jumpy, and wild, until even a trivial noise some distance from a rookery would disrupt the customary peaceful pursuit of requisite parental duties. Inevitably, in spite of efforts to minimize it, a considerable number of eggs were broken and many nests were abandoned. Incubation and brooding were also interrupted sufficiently to cause the spoiling of many eggs and the death of a considerable

number of very young chicks. Trapping was found to be potentially so destructive a factor in reproduction that, in spite of its unmatchable value in distributional, life-history, and ecological studies, it should be foregone absolutely for a period of two years if local tern populations are to be maintained. This year but two adults were trapped, and these were for an important specific purpose. All observation work was pursued from blinds erected before the first arrivals, and the chick-banding was done with meticulous care, the maximum possible dispatch, and the staggering of the work among the several colonies. Consequently not ten eggs were broken, not twenty-five abandoned and infertile nests were found on the final check-ups; and the whole cycle from courtship to the teaching of self-maintenance was carried through with serene and perfectly concentrated effort to a much earlier conclusion.

THE RECLAMATION OF TERN ISLAND

The history of the Tern Island colony from its founding by the remnant of the once very large but ultimately exiled tenantry of North Beach, through its rapid growth into the most important colony on Cape Cod, past its cyclic peak and into its geometrically progressive decadence, may be found in the published reports of other observers and ourselves. In the midsummer of 1932 it was evident that the trend of Nature, historically shown and recently predicted to recur here, had determined the inevitable and rapid dissolution of this colony. It is known also that the Cape afforded no virgin or time-reconditioned site which could offer either sanctuary or pioneering possibilities, as had Tern Island itself twenty years ago. With this colony disseminated and all the others salvable only by some improbable geographical cataclysm, the prognosis would be hopeless. Since Mr. Charles B. Floyd, for many years its enthusiastic conservator, had assigned the care and scientific possibilities of Tern Island to this station, we felt obliged at least to attempt to postpone the consummation of the tragedy. Further, we were beguiled by the problem of ascertaining whether or not human effort could restore the cycle to its peak or flatten appreciably its downward curve.

In 1933 effort was directed toward determining by observation and experiment all the patent etiological factors, their relative importance and their interrelations, and to the discovery and trial of methods of inhibiting or augmenting them. A résumé of much of this work was given in *Bird-Banding*, Vol. IV, No. 4, pp. 190–198, but one important incident was omitted. July 11th, when frustrated pairs were renesting extensively, the whole jungle of beach grass, together with its

stolons, was uprooted by hand and removed from an area fifty feet square in the heart of the most densely overgrown and sparsely tenanted part of the island, leaving a smooth plot of sand. Two days later this was so well dotted with nest hollows that a similar denudation was done in another locality. On July 19th both sites were more closely egg-covered than any other part of the island, and eight incubating birds were trapped on the first tract. At the end of the season we were committed to four essential desiderata: the complete removal by its roots of 90 per cent of the beach grass, or at least its thinning to a corresponding extent; the elimination of rats—the consummation of the latter depending greatly on the achievement of the former; the conservation of the first nesting; and the maintenance of sanctuary by the minimizing of human visitation. The efficiency of these measures would depend unquestionably on Nature being propitious or at least neutral.

The ideal site for a tern nesting is an insular stretch of sand lightly dotted with isolated tufts of beach grass or single low-leaved plants such as dusty miller and beach pea, and the cyclic peak of a colony always coincides with the maximum attainment of suitable environment. Open places facilitate nest-building, nest-approach, and incubation, and they are preëmpted invariably by the first arrivals, the foliage and grass affording tender chicks essential shelter from the elements. These conditions unobtainable, open beach fringing the site is esteemed more than densely covered locations. Roseate Terns (*Sterna d. dougalli*) elect the base of a clump of grass on the edge of an open area. Some colonies, with considerable success, however, continue to occupy sites overgrown with bushes several feet high, such as those on Hopkins Island on the Cape, and such low jungles as nearby Muskeget and Penikese Islands, but, considering relative populations, they do not achieve a proportionately equal reproduction. The obvious reasons for this persistence are the well-recognized homing instinct of birds and the existence of some favorable ecological condition which over-compensates the disadvantageous floral excess, and also the unavailability of a more suitable terrain.

Beach grass cannot be eradicated by hoeing or grubbing, for from every clump stolons several feet long branch out in all directions and interweave into a firm mat deeply below the surface. Ploughing, harrowing, and raking were chosen as the perfect answer, but conditions prevented their employment. Thus limited to the slow but efficient method of pulling out grass and roots by hand, we began at the southern

tip of the island a complete denudation, leaving only a strip four feet wide along the edge of the western bank to act as a binder against erosion by the tides. The station groundskeepers, augmented by other laborers when procurable to as many as nine, continued the denudation until late in the fall. Considerably more than the lower third was bared, also an extensive, wide strip northward in the center through the area of greatest density. By the repeated use of dynamite and fire we destroyed an old landmark, the wreck of a large scow, beneath which we exhumed a rodent colony. All litter, comprising driftwood, the remains of gunning-blinds, accumulations of thatch, and also the windrows of tide-deposited flotsam along the shores, was raked into piles to dry out for burning. When autumn had withered the grass yet standing and rendered it consumable, the uprootings were burned, and the renovation was almost complete. A careful survey in the late winter showed, by the recently opened mussel shells, the persistence of but one tenanted rat burrow. Red squill was planted generously, and subsequent inspections warranted the belief that no living rats remained. In April, this year, the shoreline was cleaned, observation blinds were erected, and another firing disposed of all remnants of the former season's grass. The island was satisfactorily clean. It was certain that not one rat remained. The grass had begun to sprout up in the area which had not been denuded.

According to the credible statements of the observant and interested fisherman, Mr. Howard Eldredge, whose home and fish-house are on the mainland shore less than one hundred yards from the island, a considerable portion of the colony returned almost in a body directly to the nesting-places the last few days in April. The unusual earliness of this event and the unexampled size of the vanguard were emphasized by the fact that he had not seen, on his daily trips to fishing-grounds far off shore, any of the birds "hanging around outside" during the preceding week as is their custom. The flock augmented rapidly, and courtship and nest-building, fostered by warm clear weather, were consummated speedily. On May 13th there were approximately ten thousand birds present densely concentrated on the southern part of the rookery, with a moderate number of pairs nesting elsewhere. [illegible] entire open area was so closely covered with nests that it was thought, in view of the terns' insistence on territorial rights, a maximum occupancy was attained. No such nest approximation had occurred since 1929 before overgrowth of vegetation began. At least one fourth of the nests in the grass-

less stretches already contained an egg, whereas only an occasional egg was found in those situated otherwise.

On May 24th it was believed that the peak population of between twelve and fourteen thousand birds had been reached about five days earlier, for there were eggs in all nests. Some courtship parading continued, but it did not terminate in copulation, as before, confirming the opinion that the males do not cease proffering food to their mates until hatching has been completed. The late comers had domiciled on the northern side of the island, where the grass, eight to ten inches tall, was not yet over dense. Here the clutch-average corresponded with that of the open terrain, suggesting that the date of important egg-laying had been passed. The egg total was unquestionably below an estimate predictable from the size of the colony, the sittings consisting of a much higher percentage of two eggs and lower of three eggs than in former years, while groups of four were exceedingly uncommon. There were very few nests close to the high-water line and but two on the low and marsh-grassed northwestern peninsula inviting eradication by leap tides.

The usual ratio between Common and Roseates Terns appeared to be unchanged from other years, also to be uniform throughout the season. The latter species, as always, had selected with but few exceptions well-grassed locations. The relative tardiness of egg-laying in this territory must not be construed to indicate a corresponding late arrival date for this species, we are seeking proof of a concept that courtship is more prolonged and fecundation longer delayed by Roseate Terns. A new group of at least twenty pairs of Arctic Terns (*Sterna paradisæa*) settled on the southern tip of the island.

Only three dead terns had been found, these presenting no evidence of mangling. Diligent search did not uncover evidence to warrant even a suspicion of rat presence. Since this eminently successful conclusion of the first and important part of the season afforded so auspicious an outlook, it was decided to restrict our visits, until hatching had been well advanced, to infrequent and short inspections. No indication for intervention having occurred in the meanwhile we returned to the island June 24th to make a comprehensive survey and begin chick-banding. Our note entry at the end of the day reads, "This colony is prospering as it has not in years." During this elapsed period the weather had been uninterruptedly favorable, while other important ecological conditions were also continuously auspicious. The control of vegetation, the banishment of rats, and the curtailment of disrupting an-

noyance by humans appeared to have been maintained sufficiently to have preserved well a precocious and exceedingly virile hatch. The uncovered spaces had not regrown beyond the outcropping of a few scattered shoots of beach grass and an occasional plant of dusty miller and beach pea. Elsewhere the grass had regrown abundantly, but the clumps were almost uniformly discrete and upstanding, permitting easy inspection of the clean underlying sand, the exceptions comprising four expanses, each from thirty to fifty feet square, along the eastern border, so densely overgrown that their exploration was tedious. Not one of the sixteen dead adults found gave evidence of violence; no burrows or other indication of rat invasion were uncovered. A full day of intensive work in banding two thousand terns provoked far less clamorous protestation, angry swooping and interruption of breeding activities than would have resulted in a much visited rookery. Although allowance for the unusual forwardness of this year's reproductive cycle had been made in the selection of the date for the commencement of banding, the degree of its advancement and prosperity exceeded our rashest anticipation. Not only had more than two thirds of the eggs in the open stretches hatched, but, of greater moment, well-grown chicks swarmed everywhere, many ran off to escape by swimming, and a considerable number were sufficiently muscled and feathered to attempt flight; only 235 dead were found.

From June 24th banding at suitable intervals was continued to its completion on July 13th, when the findings of the three final searchings signified the probable persistence of less than one hundred unbanded chicks and twenty-five abandoned clutches. During this interval two momentarily ominous discoveries were made. On June 26th, a few feet from the dune's edge on the extreme northeastern edge of the island, close to the last known tenanted rat-hole, four piles of eggs, approximating one hundred each, were found hidden beneath thick clumps of grass. A few of the shells were empty; all had the appearance and malodor of equally advanced decomposition, with no indication of periodic or recent addition of fresher eggs. The absence both then and subsequently of dead adults or chicks in the vicinity, together with the survival of all neighboring clutches, acquitted rats and convicted some unidentified humans. On June 27th, in the eastern center of the colony, within a radius of one hundred and fifty feet, were counted 49 freshly killed Roseate adults. Of two only the heads and wings remained; all the others had been bitten through the head or neck without any partial consumption of

the bodies. There being no augmentation of this group on the following days and no later repetition, the slaughter was ascribed to a casual visit by a wanton weasel or an unsuspected predator. A continuous drought not only restrained the growth and spread of vegetation but also withered the grass progressively, thus facilitating the completeness of our work. A last survey, August 2d, demonstrated the absence of renesting, the departure of the adult portion of the colony, and a scantness of the malodorous litter usually consequent to a large nesting.

It is reasonably sure that this season, for the first time in six years, not one rat subsisted on the island's munificence. This was due not alone to there being no winter-surviving members of this prolific species awaiting the return of the colony, but considerably to the failure of hunger or persecution to become grievous enough to impel the swarm of rodents known to infest near-by fish houses to emigrate across the intervening channel.

Chicks to a total of 12,498 were banded, as follows:

Date	*Banded*
June 24	1,999
26	2,500
27	1,200
29	850
July 1	1,223
3	473
4	534
5	875
6	1,724
7	490
9	458
13	88
16	84
Total	12,498

So thorough were the repeated ransackings of the rookery that this aggregate, with the addition of the 1012 dead found and buried, represents at least 98 per cent of the hatch, the remainder consisting almost exclusively of birds eluding capture by flight. The escape of the 2 per cent might have been obviated by banding very young chicks, a procedure certain to increase mortality and so avoided. The banding percentages were: Arctics .06, Commons 81.43, Roseates 18.51. Since these represent the attainment of an almost perfect nesting and vary only fractionally from those for all immature bandings on the Cape since 1922 (see table), they must coincide with the percentages for adult populations. Roseates constituted 17.80 per cent of the first four days' bandings and 29.36 per cent of

the last four days, confirming our belief in a relatively later reproduction date for this species. On July 1st 62.2 per cent of the bandings were completed; on July 7th 94.9 per cent. The attainment of these percentages is shown by our records to have been from ten to fourteen days earlier than usual.

From observations and numerous but incomplete counts made over a period of five years it was inferred that the average chick mortality is between 20 and 25 per cent. This season all dead birds were counted and buried when discovered, and records were made of the band-numbers of those previously ringed, with the following findings:

Unbanded	1,012 =	7.48 per cent of total hatch
Banded	439 =	3.52 per cent of total bandings
Total	1,451 =	10.74 per cent of total hatch
Commons	91.50	per cent of banded dead
Roseates	8.11	per cent of banded dead
Arctics	.29	per cent of banded dead

The usual ecological circumstances of this season, already shown, preclude considering 1.74 per cent an average death-

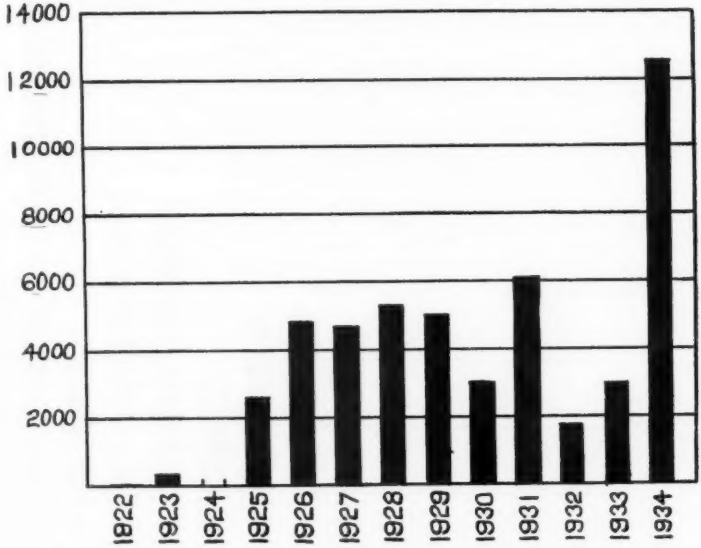

Figure 1. Histogram showing yearly bandings of immature Terns on Tern Island.

rate; nevertheless the salutary effect of human intervention is evident. Nor does it indicate survival and replacement rates, for we continue to receive from near-by points bands removed from dead young of the year. The disparity of Common and Roseate mortalities is evidently the result of divergent nesting habits. Concentration of dead occurs invariably in the open areas where greater exposure results in the killing of an overwhelming proportion of recently hatched Commons. Roseates elect the shelter of the most densely vegetated tracts and hatch later when the growth is more advanced. Their chicks, except when the parents are present, huddle well under the grass and exhibit none of the *wanderlust* observed from blinds to activate young Commons. After chicks have been frightened into cover, Roseates are usually found at the very bottom of a well-hidden pile. Head-pecking, in preceding seasons the cause of a considerable mortality and discussed in a former article from the standpoint of its inferred relationship to territorial

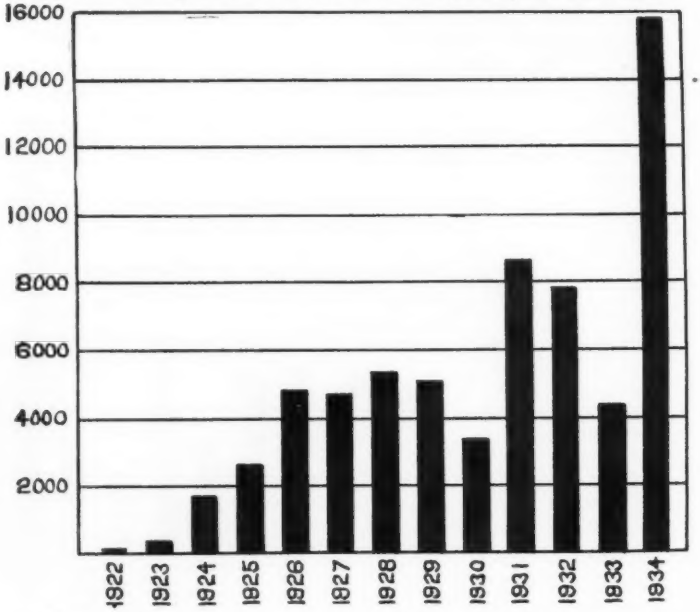

Figure 2. Histogram showing yearly bandings of immature Terns on Cape Cod.

rights, inexplicably was found to have occurred only six times.

Although our records contain a considerable amount of unused confirmatory data, it is believed there are sufficient facts in the foregoing narration to demonstrate conclusively the almost maximum attainable efficiency of this first nesting. Indubitably, second clutches were laid, but to so small an extent and so early in the season that they over-lapped and were indistinguishable from the primary egg-laying. We are certain that no thwarted members of this colony repaired, for a second endeavor to other sites as they had last year.

Two histograms are presented to point out the relative yearly success of this colony and its close duplication of the annual accomplishment of the aggregate Cape tern population, particularly since the comprehensive bandings of all colonies began in 1931.

The future of this key colony is precarious. Unless reclamation work is continued and even better protection is given, a prompt reversion to its baneful status in 1933 is inevitable. It is equally portentous that in two years natural forces have built out from the southern end of the island a chain of sand-bars and grassed mud-banks until at low tide only a narrow, easily fordable strait of water separates it from the mainland. A return to its former peninsularity is not unlikely. However, this station anticipates continuing its experiment and is endeavoring to discover more efficient and less costly methods of reclamation, profiting by this year's work which has been, for instance, a radical grass-thinning rather than a complete denudation.

EGG ISLAND

The deterioration of this colony, which attained in 1932 an almost ideal perfection, has progressed more rapidly. This is the result of the overbalancing of an otherwise favorable environment by two serious etiological conditions, a diminution of nesting territory and the overgrowth of vegetation. The original sparsely plant-grown, low-lying ellipse of sand has been divided by storm-driven tides into four small islets, connected only at low water by sand-bars with an erosion of more than one third of its territory. The greater part of surviving land is covered now by a dense conglomeration of widely spread clumps of dusty miller, tall beach grass, and dried thatch. The importance of this is shown by the increase in Roseate chick-bandings from 16.1 per cent in 1933 to 30.9 per cent this year. Since the island had supported a probable maximum occupancy the former season, the estimated shrinkage of the flock to the extent of one third was inevitable. The only known

vicissitude it experienced was the usual unimportant depredation by owls, they having consumed 30 adults during the early part of the nesting and later an equal number of well-grown Roseate chicks. While its cycle, as always, began and ended later than Tern Island's, it similarly attained consummation two weeks earlier than ever before; likewise no renesting was perceived. Its reproductiveness and its unparalleled survival accomplishment are shown by the following totals:

Chicks banded	2,620
Dead unbanded chicks	22
Dead banded chicks	55 = 2.09 per cent of bandings
Total dead	77 = 2.93 per cent of the hatch

Proof of the postulated gradual dispersal of this colony is afforded by there having been banded less than one half as many chicks this year as in 1932. This is not controverted by a doubling, this season, of the 1933 aggregate, insomuch as in that summer storms decimated the first hatch and the second laying was even less fruitful.

BILLINGSGATE ISLAND

The persistent group of terns which, allured by some compelling ecological conditions as isolation and the assurance of an overabundant food-supply, had returned annually to confront unescapable adversities on this site, fared well this season. During the winter, sand-depositing currents unhindered by destructive storms had built up considerably the tide-flooded sand-bar which, last summer, was all that remained of this formerly inhabited island. Shaped like an L, five hundred yards long, varying in width from fifty to two hundred feet, and at most six feet above the usual high-water mark, it was absolutely devoid of vegetation. The reports which came in early June of the presence of an unusually large number of birds were interpreted to refer to the flocks of Herring Gulls always congregated there. Subsequent tidings of extensive egg-laying corrected this misapprehension, but it was believed the imminent spring tide would efface the nesting, as it had last year. Neither this nor any other mishap betided; consequently, July 12th, after a preceding scrutiny, the entire eminently successful hatch of 641 well-grown chicks, exclusive of approximately 50 already on the wing, were banded. For the facilitation of completeness and the prevention of escape by swimming a corral was erected in the center of the island, with wings of wire fencing extending diagonally outward on both sides some distance out into the water. Into this the chicks were driven from both extreme ends. A repetition of

this year's achievement and a restoration of the island itself are contingent to events so improbable that anticipation is unwarranted.

OTHER COLONIES

That to the preponderance of terns the homing instinct is far less bionomically impelling than the obtainment of advantageous environment may be inferred from the minimal occupancy, this summer, of small and disadvantageous sites. First endeavors on all the large breeding grounds were so prosperous that no renesting impulse induced emigration from there to previously futile locations. Not one pair nested on either North Beach or Nauset Marsh, and merely twenty primal couples on Nauset Point, whereas in 1933 all three places were well occupied, particularly during July. A careful exploration of Jeremy's Point demonstrated for the second year a complete absence of nesting. The usual diminutive flock on Rocky Island repeated its ineluctable fiasco.

The exact status of Hopkins Island, the home in 1929 of a promising, ecologically favored colony composed chiefly of Arctics, was not determined. Half of the three hundred adults which had arrived early in May were continuing breeding deportment in mid-July, but rank overgrowth precluded an interpretation. The whole top of the island, excepting a small plot of tangled grass and vines, and the sides almost to the marsh-edge, were a thicket of bushes from four to seven feet high screening a recently built elaborate gunning-stand and limiting the aggregate of passably suitable nest-sites to fifty square feet. What occurred in such terrain it was impossible to discover. July 8th, by dint of extraordinary searching, 32 well-grown chicks were banded, and 15 nests were found, containing a total of 38 eggs. Renesting as an explanation of the lateness of this egg-persistence is not tenable for it was determined by adult trapping late last year that birds defeated here repaired to Nauset Point for a reattempt.

The correctness of preceding assumptions is established by the banding of 15,820 chicks and by the comparison of this total with those for former years. It is hoped this station will be permitted to continue this tern study in 1935 for the most enticing feature of the work has been the repeated refutation of concepts and deductions by subsequent observations.

Because there have been many obvious errors in totals and tables recently published, all available records of tern-bandings on Cape Cod have been studied and all obtainable data appraised. Correct statistics have been secured by listing and verifying all band-numbers. These have been compiled in the appended tables.

TERN BANDINGS

Year	Pamet Point		Tern Island		North Beach		Hopkins Island		Billingsgate Is.		Cotuit	
	Immat.	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*
1922	102	.....	49	.....	.....	.....	.....	.....	.....	.....	.....	.....
1923	4	.....	376	.....	.....	.....	.....	.....	.....	.....	.....	.....
1924	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1925	.....	.....	2,594	.....	1,689	.....	.....	.....	.....	.....	.....	.....
1926	.....	.....	4,830	.....	.....	.....	.....	.....	.....	.....	.....	.....
1927	.....	.....	4,703	.....	.....	.....	.....	.....	.....	.....	.....	.....
1928	.....	.....	5,331	164	.....	.....	.....	.....	.....	.....	.....	.....
1929	25	67	5,005	577	.....	.....	5	70	26	204	39	.....
1930	194	.....	3,020	201	.....	.....	129	.....	.....	38	.....	.....
1931	125	35	6,119	39	.....	.....	122	12	426	.....	.....	.....
1932	5	12	1,754	707	256	287	163	1	118	52	.....	.....
1933	42	108	2,971	831	2	5	3	.....	.....	139	.....	.....
1934	.....	.....	12,498	4	.....	.....	32	.....	649	.....	.....	.....
Total	497	222	49,250	2,523	1,947	292	454	83	1,219	433	39	.....

TOTAL BANDINGS ON CAPE COD.

Year	*Adults*	*Chicks*
1922	0	151
1923	0	380
1924	0	1,689
1925	0	2,594
1926	0	4,830
1927	0	4,703
1928	164	5,331
1929	918	5,100
1930	248	3,344
1931	86	8,648
1932	1,239	7,834
1933	2,648	4,376
1934	4	15,820
Total	5,307	64,800

CHICKS BANDED ON CAPE COD

Year	*Tern Island*	*Elsewhere*
1922	49	102
1923	376	4
1924	0	1,689
1925	2,594	0
1926	4,830	0
1927	4,703	0
1928	5,331	0
1929	5,005	95
1930	3,020	324
1931	6,119	2,529
1932	1,754	6,080
1933	2,971	1,405
1934	12,498	3,322
Total	49,250	15,550

CHICKS BANDED ON CAPE COD—1922 THROUGH 1934

	Roseate	*Common*	*Arctic*	*Least*
Pamet Point	5	486	6	0
Tern Island	9,121	40,106	23	0
North Beach	203	1,743	1	0
Hopkins Island	0	452	2	0
Billingsgate Island	24	1,195	0	0
Cotuit	0	39	0	0
Stony Island	0	35	0	0
Jeremys Point	0	1	0	0
Nauset Point	0	14	5	11
Nauset Marsh	0	150	5	0
Egg Island	2,289	8,883	0	0
Little Sipson Island	0	1	0	0
Total	11,642	53,105	42	11
Per cent	17.97	81.95	00.07	00.01

North Eastham, Cape Cod, Massachusetts.

CAPE COD, MASSACHUSETTS

Stony Island		*Jeremys Point*		*Nauset Point*		*Nauset Beach*		*Egg Island*		*Little Sipson Is.*	
Immat.	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*	*Immat.*	*Adult*
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	9	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	9	.....	41	.....	1,775	.....	.....	.....
4	.....	.....	.....	.....	.....	108	126	5,425	54	1	.....
.....	.....	.....	.....	.....	.....	6	163	1,352	1,402	.....	.....
.....	.....	.....	.....	21	.....	.....	.....	2,620	.....	.....	.....
35	9	1	.....	30	.....	155	289	11,172	1,456	1	.....

BIBLIOGRAPHY

AUSTIN, O. L.
1932. "The Status of Cape Cod Terns in 1932." *Bird-Banding*, Vol. III, No. 4, October, 1932, pp. 143–156.

AUSTIN, O. L., JR.
1929. "Contributions to the Knowledge of the Cape Cod Sterninæ." *Bull. N. E. B. B. A.*, Vol. 5, No. 4, October, 1929, pp. 123–140.
1930. "The Statistical Trends of Banding." *Bird-Banding*, Vol. I, No. 1, January, 1930, pp. 20–28.
1932. "Further Contributions to the Knowledge of the Cape Cod Sterninæ." *Bird-Banding*, Vol. III, No. 4, October, 1932, pp. 123–139.
1933. "The Status of Cape Cod Terns in 1933." *Bird-Banding*, Vol. IV, No. 4, October, 1933, pp. 190–208.

BAYNARD, O. E.
"Foods of Herons and Ibises." *The Wilson Bulletin*, No. 81, Vol. XXIV, pp. 167–169.

BENT, A. C.
1921. "Life Histories of North American Gulls and Terns." Smith, Inst., U. S. Nat. Mus., *Bull.* 113, 1921, pp. 236–264, 109–112, 160–161.
1926. "Life Histories of the North American Marsh Birds." Smith, Inst., U. S. Nat. Mus., *Bull.* 135, 1926, pp. 207-208.

BREWSTER, W.
1879. "The Terns of the New England Coast." *Bull. Nuttall Ornithological Club*, Vol. 4, No. 1, January, 1879, pp. 13–21.

FLOYD, C. B.
1925. "Six Days in a Massachusetts Tern Colony." *Bull. N. E. B. B. A.*, Vol. I, No. 4, October, 1925, pp. 58–60.
1926. "Additional Experiences in Banding Terns at Tern Island." Chatham, Mass., *Bull. N. E. B. B. A.*, Vol. II, No. 4, October, 1926, pp. 68–72.
1927. "Notes on the Development of Young Common and Roseate Terns." *Bull. N. E. B. B. A.*, Vol. 3, No. 4, October, 1927, pp. 95–101.
1928. "Notes on Banding Terns at Chatham, Mass., for 1928." *Bull. N. E. B. B. A.*, Vol. IV, No. 4, October, 1928, pp. 125–132.
1929. "Notes on Banding Terns at Chatham, Mass., for 1929." *Bull. N. E. B. B. A.*, Vol. V, No. 4, October, 1929, pp. 144–148.
1930. "Further Banding Notes from Tern Island, Mass." *Bird-Banding*, Vol. I, No. 4, October, 1930, pp. 181–184.
1932. "Report of Tern Banding on Cape Cod During 1932." *Bird-Banding*, Vol. III, No. 2, April, 1932, pp. 63–65.

FORBUSH, E. H.
1925. *Birds of Massachusetts and Other New England States*, Vol. I, pp. 105–126.

EASTERN FIELD SPARROW MIGRATION IN TENNESSEE

By AMELIA R. LASKEY

A STUDY of the records of Field Sparrows (*Spizella pusilla pusilla*) banded at my trapping stations in Nashville, Tennessee, from August 5, 1931, to March 31, 1933, indicated that there was a definite migration movement in spring and fall, although Field Sparrows had been considered permanent residents in this State, as the species is present every month in the year. (*Journal Tennessee Academy of Science*, Vol. VIII, No. 3, pp. 265–7.) In that time 620 individuals were banded; 347 of that number were recaptured many times, including fifty "returns" in the nineteen-month period. The records of the ensuing fifteen-month period further substantiate this theory of a definite spring and fall migration movement, and in addition show how very few birds of this species are present in a given location throughout the entire year. A total of 1115 Field Sparrows have been banded up to June 17, 1934, 500 of which have not been retaken since banding. The remainder, 615, have yielded several thousand repeats, thus giving a very definite idea of the length of time an individual frequents the vicinity of the banding station. Field Sparrows here enter traps readily for millet and water, the repeat records giving a fairly accurate account of the number about the station. A study of these records (Table No. II) shows that they may be classified as winter residents, summer residents, and spring and fall migrants, with a few that have changed their status during a two-year period, migrating one year but remaining the second year. Among the large number banded only seven may be considered as probable permanent residents, for their non-appearance as repeats during a period one of or two months could easily be accounted for by an abundance of water and natural food near by.

In the spring the migrants can be distinguished from the wintering birds by their brighter plumage and clean appearance in contrast to the dull, darker-colored birds that have come in contact with suburban soft-coal soot. Repeat records show that many of these spring and fall migrants enter traps almost daily for a few days or weeks, and then disappear, some of them returning the next season, as shown by the tabulated returns herewith. A few remain for either the winter or the summer. Unfortunately not one recovery has been reported as yet to

indicate either distance or direction traveled by these banded Field Sparrows after they leave the station.

The following table (No. I) shows definite spring and fall peaks in number of birds banded. October and November in the fall, and February, March, and April in the spring, bring increased numbers of new birds as well as the largest number of returns of banded birds. In 1934, the spring peak occurred in April and was doubtless due to the unusually cold, stormy weather in early spring this year here.

TABLE I

		Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1931	Adults	0	0	0	0	0	0	0	2	3	26	0	0
	Immat.	0	0	0	0	0	0	0	1	3	0	0	0
1932	Adults	0	20	57	23	5	8	9	2	5	66	72	23
	Immat.	0	0	0	0	0	44	21	5	4	0	0	0
1933	Adults	13	60	145	51	1	0	5	17	1	31	50	25
	Immat.	0	0	0	0	1	6	31	25	7	0	0	0
1934	Adults	25	16	70	127	2	1						
	Immat.	0	0	0	0	7	(nestlings)						

TABLE II

FIELD SPARROW RETURNS AND REPEAT RECORDS

Status		*Age*	*Date of Banding*	*Return–1*	*Return–2*	*Return–3*	*No. of Repeats*
M	F70903		Oct. 3, 1931	Apr. 6, 1932			1
M	F70905		Oct. 3, 1931	Mar. 9, 1932			66
X	F70913		Oct. 13, 1931	Oct. 9, 1932	Mar. 28, 1933	Apr. 3, 1934	28
X	F70915		Oct. 13, 1931	June 25, 1932	Oct. 30, 1932	Nov. 7, 1933	1
M	F70921		Oct. 23, 1931	Mar. 2, 1932	Mar. 6, 1933		37
M	F70924		Oct. 27, 1931	Feb. 18, 1932	(remained until 5/16/32)		79
W	F70942		Feb. 12, 1932	Nov. 14, 1932			30
M	F70944		Feb. 13, 1932	Nov. 12, 1932			5
M	F70948		Feb. 18, 1932	Oct. 14, 1932			2
W	F70950		Feb. 23, 1932	Nov. 22, 1932	Nov. 21, 1933		46
M	F70951		Feb. 23, 1932	Nov. 2, 1932	Nov. 8, 1933		16
M	F70954		Feb. 24, 1932	Mar. 2, 1933			13
M	F83311		Feb. 28, 1932	Nov. 12, 1932			..
W	F83325		Mar. 4, 1932	Dec. 4, 1932			3
W	F83328		Mar. 6, 1932	Dec. 14, 1932	Jan. 26, 1934		23
W	F83330		Mar. 7, 1932	Oct. 23, 1932			55
M	F83332		Mar. 7, 1932	Mar. 21, 1933			4
X	F83338		Mar. 8, 1932	Nov. 11, 1932	Mar. 16, 1933	Dec. 9, 1933	29
W	F83348		Mar. 11, 1932	Dec. 14, 1932			5
W	F83349		Mar. 12, 1932	Jan. 4, 1933			11
X	F83350		Mar. 12, 1932	July 26, 1932	Mar. 14, 1933		26
M	F91208		Mar. 17, 1932	Mar. 6, 1933			30
X	F91221		Mar. 24, 1932	Mar. 16, 1933			137
M	F91234		Mar. 31, 1932	Sept. 6, 1932			4
S	F91262		Apr. 24, 1932	July 17, 1933	Apr. 4, 1934		6
S	F91276	Ad.	May 10, 1932	Apr. 28, 1933			13
M	F91279	Ad.	May 16, 1932	Apr. 4, 1934			8
M	F91283	Ad.	May 18, 1932	Mar. 22, 1933			23
S	F91293	Ad.	June 6, 1932	Mar. 18, 1933	July 23, 1933		5
..	F91607		June 18, 1932	Oct. 6, 1933			1
S	F91609	Ad.	June 18, 1932	Mar. 16, 1933	Mar. 17, 1934		42
S	F91622	Ad.	June 22, 1932	Mar. 18, 1933			53
M	F91630	Im.	June 22, 1932	Oct. 6, 1932	Apr. 7, 1933		6
M	F91634	Im.	June 23, 1932	Feb. 25, 1933			22
M	F91646	Im.	June 24, 1932	Mar. 23, 1933			14
M	F91655	Im.	June 24, 1932	Mar. 14, 1933	Mar. 22, 1934		7
M	F91683	Ad.	July 18, 1932	Mar. 18 1933			24

Status		Age	Date of Banding	Return–1	Return–2	Return–3	No. of Repeats
M	F91685	Im.	July 19, 1932	Mar. 21, 1933			3
M	F91697	Im.	July 23, 1932	Mar. 15, 1933			13
M	H17804	Im.	July 30, 1932	Feb. 27, 1933			5
S	H17805	Ad.	July 30, 1932	June 26, 1933	Apr. 24, 1934		16
S	H17808	Ad.	July 31, 1932	Feb. 27, 1933			69
X	H17818	Im.	Aug. 25, 1932	Aug. 15, 1933	(remaining to date)		85
M	H17828	Im.	Sept. 1, 1932	Apr. 7, 1933			4
X	H17829	Im.	Sept. 1, 1932	Mar. 16, 1933	Oct. 11, 1933		70
S	H17838	Ad.	Sept. 9, 1932	Apr. 1, 1933	Mar. 15, 1934		71
M	H17873		Oct. 3, 1932	Mar. 31, 1933			3
S	H17876		Oct. 5, 1932	July 6, 1933	Apr. 15 1934		36
W	H17877		Oct. 5, 1932	Dec. 8, 1933			31
M	H17880		Oct. 5, 1932	Mar. 15, 1933	Aug. 28, 1933	Mar. 9, 1934	33
M	H17894		Oct. 7, 1932	Mar. 23, 1933			1
M	H27504		Oct. 8, 1932	Mar. 18, 1933			14
M	H27509		Oct. 9, 1932	Apr. 2, 1933			20
M	H27511		Oct. 9, 1932	Mar. 16, 1934			1
M	H27517		Oct. 9, 1932	Mar. 18, 1933			8
W	H27524		Oct. 10, 1932	Jan. 17, 1934			10
M	H27563		Oct. 28, 1932	Mar. 16, 1933			15
M	H27583		Nov. 1, 1932	Mar. 7, 1933			.
W	H27585		Nov. 2, 1932	Dec. 11, 1933			77
M	H27587		Nov. 2 1932	Mar. 24, 1934			3
M	H27595		Nov. 6, 1932	Mar. 29, 1933			3
W	H27598		Nov. 8, 1932	Nov. 6, 1933			25
M	H32617		Nov. 10, 1932	Mar. 2, 1933			1
M	H32636		Nov. 13, 1932	Feb. 27, 1933			37
M	H32637		Nov. 13, 1932	Mar. 10, 1933			6
W	H32646		Nov. 25, 1932	Nov. 27, 1933			24
W	H32647		Nov. 25, 1932	Jan. 28, 1934			7
W	H32658		Dec 4, 1932	Dec. 11, 1933			16
W	H32670		Dec. 12, 1932	Nov. 20, 1933			36
W	H32673		Dec. 15, 1932	Dec. 27, 1933			28
	H32676		Dec. 17, 1932	Mar. 28, 1934			2
W	H32679		Dec. 19, 1932	Nov. 28, 1933			16
W	H32707		Jan. 9, 1933	Dec. 10, 1933			21
M	H32719		Feb. 3, 1933	Mar. 18, 1934			.
S	H32774		Feb. 15, 1933	July 7, 1933	Mar. 15, 1934		71
M	H33872		Mar. 7, 1933	Nov. 11, 1933			45
S	H33974		Mar. 27, 1933	Mar. 24, 1934			61
M	H33986		Mar. 28, 1933	Mar. 27, 1934			47
M	H38776		Apr. 24, 1933	Nov. 13, 1933			3
S	H38801	Ad.	July 4, 1933	Mar. 30, 1934			22
S	H38833	Im.	July 18, 1933	Mar. 13, 1934			180
S	H38845	Ad.	July 29, 1933	Mar. 2, 1934			23
S	H38848	Im.	July 31, 1933	Mar. 16, 1934			68
S	H38863	Ad.	Aug. 9, 1933	Apr. 4, 1934			36
M	H38878	Ad.	Aug. 19, 1933	Mar. 3, 1934			1
S	H38911	Ad.	Aug. 28, 1933	Apr. 28, 1934			3
S	H38960		Oct. 6, 1933	Mar. 15, 1934			33
S	H38962		Oct. 6, 1933	Mar. 9, 1934			85
M	H38972		Oct. 10, 1933	Apr. 14, 1934			.
M	H38973		Oct. 10, 1933	Feb. 13, 1934			5
S	H38974		Oct. 10, 1933	Apr. 28, 1934			9
M	H38993		Oct. 27, 1933	Apr. 14, 1934			.
M	L38807		Nov. 11, 1932	Mar. 14, 1934			13
M	L38844		Nov. 19, 1933	Apr. 14, 1934			4
M	L38862		Nov. 22, 1933	Mar. 6, 1934			16
M	L38874		Nov. 26, 1933	Mar. 26, 1934			2

M indicates repeat records which show migration stops in the spring, or fall, or both (migrating returns).

S indicates the bird is a summer resident.

W indicates the bird is a winter resident.

X indicates birds that have changed their status, migrating a portion of the time and spending either one winter or one summer at the station during either their first or second year banded.

The ages of birds are given only during the summer months of May through September, because after the fall molt age cannot

be determined by plumage in this species. Birds designated as immature were not banded from the nest, and therefore may have traveled some distance to the banding station from their nesting-grounds.

These Field Sparrow repeat records show that my returns may be divided into three kinds as follows: (1) returns to nesting grounds; (2) returns to wintering grounds; and (3) returns taken while the birds are migrating, migrating returns. About fifty per cent of the Field Sparrow returns listed should be classified as migrating returns, one third of them being trapped in the spring and the remaining two thirds returning both in the spring and in the fall.

June 17, 1934.

THE DISTRIBUTION OF MICHIGAN RECOVERED EASTERN EVENING GROSBEAKS NEAR THE ATLANTIC SEABOARD

By M. J. MAGEE

As there has been during the fall and winter seasons of 1933–34 a large influx of Eastern Evening Grosbeaks (*Hesperiphona v. vespertina*) in New England and Canada, and as additional recoveries of birds banded in Michigan have been made in the East, it seems desirable to publish a complete list of known recoveries, and to show their distribution on a map. In addition to birds banded in Michigan and recovered in the East, two Grosbeaks banded in the East have been recovered in Michigan, one of these occurring on May 31st, indicating that the bird nested in that State.

The map only shows recoveries between the Eastern part of the Upper Peninsula of Michigan and the East.

To the West there are light records: Manitoba, one; Minnesota, three; and Western part of the Upper Peninsula of Michigan, four.

Eight Evening Grosbeaks, banded in the Eastern part of the Upper Peninsula, have also been taken in southern Michigan, and one banded in southern Michigan was trapped at my station in Sault Ste. Marie, Michigan.

Owing to this scarcity of food for seed-eating birds, the Evening Grosbeaks began moving out of the eastern part of the Upper Peninsula of Michigan early in October, 1933, and during the winter, except for a small flock at my feeding station,

there were practically none about. Reports indicate that many more Evening Grosbeaks than usual were in Southern Michigan and the New England States, and birds banded in the eastern part of the Upper Peninsula of Michigan were in many of the flocks.

Usually as winter wanes the number of Evening Grosbeaks feeding at my station increases, until by March it is not unusual to see seventy-five or more in the trees near my house almost any morning. This year practically none arrived until the last of April, and then many appeared. I banded over three hundred in May and could have banded many more if I had had the time to devote to it. Early in June all but a few strays left to nest. The last one banded was on June 17th, and the last seen were an adult male and an adult female, June 20th.

Evening Grosbeaks can be found during the nesting season in the heavily-wooded portions of the eastern part of the Upper Peninsula of Michigan, beginning about forty miles west of Sault Ste. Marie. So far as I know, however, only once have nests been located there, and that was in 1922. Five nests and an injured fledgling were found at Whitefish Point, about forty-five miles Northwest of Sault Ste. Marie. The list follows:

RECOVERIES IN MICHIGAN AND AT POINTS IN THE EAST AS OF JUNE 30, 1934

Banded by M. J. Magee at Sault Ste. Marie, Michigan	Recoveries
A221387, Adult Male Dec. 14, 1930	Caught June 18, 1932, Harcourt, Ont., by C. Holbrook. (16)
A309057, Adult Male March 16, 1929	Found Jan. 1, 1930, Conklin, N. Y., by C. J. Getman. (15)
A280171, Adult Male Feb. 19, 1933	Caught Oct. 18, 1933, Bigelow, N. Y., by Mrs. A. Cassaw. (14)
110630, Adult Female March 23, 1924	Found, reported March 13, 1926, St. Charles, Quebec, by L. K. Richard. (2)
393454, Adult Male Feb. 2, 1927	Caught Feb. 10, 1928, Loretteville, Quebec, by M. Verret. Was kept until spring and then released. (1)
338520, Adult Male March 14, 1925	Trapped Jan. 30, 1928, West Hartford, Conn., by Mrs. H. J. Pratt. (12)
A221441, Adult Female March 1, 1931	Found dead about Dec. 31, 1933, North Scituate, Rhode Island. Not reported by whom found. (13)
462170, Adult Female March 10, 1927	Trapped Feb. 22, 1928, Huntington, Mass., by D. Messer. (7)
A217456, Adult Female May 16, 1929	Trapped Feb. 8, 1930, Topsfield, Mass., by Miss E. V. Perkins. (8)
331320, Adult Male Nov. 16, 1925	Found dead April 10, 1930, Cohasset, Mass., by Thomas Brown. (9)
A309060, Adult Female	Found dead, March 31, 1930, Boston,

March 16, 1929 — Mass., by F. B. Bemis. (10)
462165, Adult Female — Trapped March 22, 1930, Sandwich,
March 9, 1927 — Mass., by Mrs. George Burbank. (11)
Returned March 12, 1928
Returned March 14, 1931
B248797, Adult Female — Trapped Dec. 4, 1933, Peterboro, N.H.,
April 9, 1933 — by C. L. Whittle. (5)
B261619, Adult Female — Trapped Feb. 26, 1934, Milford, N. H.,
Oct. 12, 1933 — by J. P. Melzer. (6)
691353, Adult Male. — Found dead April 2, 1934, Gardiner,
Jan. 27, 1929 — Me., by R. S. Dowling. (4)
Banded by Dr. K. Christofferson
at Blaney Park, 80 miles, West
South West of Sault Ste. Marie,
Mich.
A275847, Adult — Trapped Feb. 28, 1934, Presque Isle,
March 11, 1932 — Me., by G. D. Chamberlain. (3)
Banded by Mrs. R. D. Kilborne
at Hanover, N. H.
581875, Adult Female — Trapped Jan. 27, 1929, Sault Ste.
March 9, 1928 — Marie, Mich., by M. J. Magee. (17)
Banded by J. P. Melzer
at Milford, N. H.
34-208502, Adult Female — Trapped May 31, 1934, Sault Ste.
Jan. 11, 1934 — Marie, Mich., by M. J. Magee. (18)

The appended numbers also appear on the accompanying map.

That readers may have a glimpse of the extent and wide distribution of the exodus of Evening Grosbeaks from Michigan during the fall and winter season of 1933–1934, the following excerpts are taken from letters received from Mrs. Kenneth B. Wetherbee covering Massachusetts; from Mr. Lewis O. Shelley covering New Hampshire, and others. It will be noticed that the birds recorded by them have seldom departed from the transition life-zone in which they mainly nest.

From Mrs. Kenneth B. Wetherbee

Evening Grosbeaks were more abundant in Massachusetts and Connecticut last winter than usual. Although they are reported as regular winter visitors at least from North Brookfield, Massachusetts, and from Moosup, Connecticut, and doubtless from other sections of these States, their numbers at these stations last winter were much larger than during former winters. They were reported from many places where they have rarely if ever been seen before. The flocks numbered from five individuals to more than one hundred.

In Connecticut reports came from Wilton, New London, Windsor, East and South Windsor, Hartford, West Simsbury, Bloomfield, Hampton, and North and East Woodstock. These were casual reports, but as these towns are located in

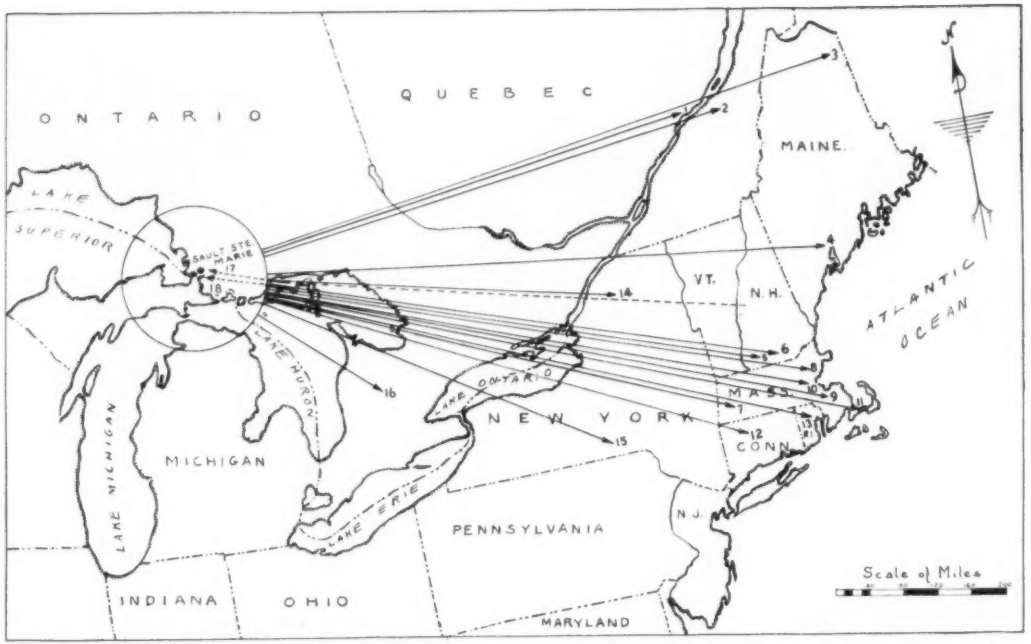

Figure 1. Map of Michigan Evening Grosbeak recoveries in the East, and recoveries in Michigan of birds banded in New Hampshire (dotted lines Nos. 17 and 18).

northern, eastern, southern, and western Connecticut, doubtless the birds were widely scattered over the State. Aaron Bagg reported them from Holyoke, and Laurence B. Fletcher reports them from Cohasset. They were also reported from Williamstown, Littleton, Sharon, Lexington, Hanover, Fitchburg and Boston. In Worcester County, where I gathered reports, Evening Grosbeaks were reported from nearly every town in the county. Only one town in the county reports them yearly — North Brookfield. One other town reported them in 1904, 1907, 1910, 1913, 1914, 1922, 1926, 1932 and 1933. In the other towns they had rarely or never been reported.

At a number of stations the birds came to feed mostly in the morning, though at some stations they fed at intervals during the day. The males seemed to be more numerous than the females at several stations, and at one place there were two or three males to one female. The earliest date reported was October 14th, and the latest May 19th.

At Mrs. Newman's in North Brookfield, where the birds were regular visitors, during the last days of their stay a male was seen taking a sunflower seed to a female, and in several places males were seen carrying twigs.

Dr. F. W. Keys, of Ipswich, Massachusetts, reports that he had more than fifty Grosbeaks for three weeks feeding within two feet of a window, eating more than a quart of sunflower seeds at a meal.

From Lewis O. Shelley and others

Mr. Shelley made a careful canvass of the Grosbeaks reported from many places in New Hampshire, securing reports from numerous towns.

In Antrim, Mrs. Rachel Caughey reports a flock of twenty wintering birds. In Barnstead twelve were seen. In Concord small flocks were noted in December. In East Westmoreland twenty-two were observed in November. In Elmwood they were present all through November, about one hundred in the flock, and they remained until snow covered the maple trees and the fruit on which they fed.

In Goffstown small flocks were present throughout the winter. On December 20th a flock of twenty were seen at St. Anselm's College grounds.

A flock of thirty fed on sunflower seeds at a feeding station near the Dartmouth College grounds, Hanover, the flock appearing on January 30th.

In Hillsboro on April 16th a flock of eighteen was still

present, feeding on sunflower seeds and chick-feed. Individuals remained here as late as May 6th. (D. A. Whittle.)

In South Lyndeboro on December 1st four birds were seen by Mrs. James Putnam at her home, and they came every day for a week. At her brother's home two miles distant they had a flock of twenty about the same time. About three hundred arrived the first part of November where a road is lined with maples having abundant fruit on which the birds fed. In late November, the flock dwindled to about thirty, and about mid-March decreased to twelve, and then all disappeared.

In Manchester on December 6th twenty were seen, and small flocks were noted throughout the month.

In Marlboro on January 3d twenty-nine were present, and again on January 10th. They remained all winter.

In Peterboro the Grosbeaks were first seen on December 1st, when twenty to twenty-five were seen at my feeding-shelf. A few days later forty were present, but by February 14th the flock was reduced to nineteen, seven females and twelve males. In all twenty-six were banded with colored bands. From April 10th to the 26th, when the last one was seen, the attendance became highly variable, but gradually decreasing, and the interest in food also lessened. (C. L. Whittle.)

Milford: Mr. James P. Melzer reports that he banded 81 Grosbeaks during the winter season, 46 of which were males, or nearly 57 per cent. That some importance should be attached to this ratio of the sexes is indicated by the fairly large number of birds considered. In addition to the 81 birds banded, Melzer estimates that there were about 300 more seen in various parts of the village.

In Mount Vernon a flock of twelve or fifteen were first seen on November 26th, feeding on maple seeds. (Mrs. Roy M. Hutchinson.)

Sandwich: April 3d, a flock seen feeding on maple seeds on the ground. (R. H. Thompson, Jr.)

Sanbornton: One bird came to a maple the morning of November 7th. The next morning fifteen appeared, and on November 17th there were twenty to twenty-five, on each occasion stopping only a few minutes. However, a mile distant a neighbor had forty feeding in her yard. (E. C. Weeks.)

Strafford: Eight birds (apparently the first reported for New Hampshire) were seen on October 26th, 1933, and thirteen on November 6th. Their stay was brief. (George C. Atwell.)

Squantum: First seen the last of January and the first of February, twenty-five birds in all.

A few Grosbeaks were also reported in Francestown, Franklin, Jaffrey, Barnstead, New Boston, and Greenfield (as late as April 30th).

In Vermont, L. O. Shelley reports several flocks seen, one flock not leaving until May 15th, when normally the birds should be on their breeding-grounds.

"Miss Anna Reynolds of Burlington, Vermont reports that during the winter of 1933–34 she had a few coming to her feeding station sometime in December and that they continued until May 1st, when there were twenty-four, six of the number being males. One Burlington woman last saw them on May 12th. In Grand Isle County, where there are extensive orchards, they were reported frequently during last winter, feeding on unharvested apples.

I have banded none at Wells River, Vermont. Flocks have never remained about the station for more than two days at a time and usually for only a few hours. They have never visited the feeding stands of which there are both those with traps and those that are trapless. The buds of maples, unharvested apples, and sometimes the fruit of *Rhus typhina* have been the only attractions in the food line. My dates follow: On December 16, 1933 six were seen, five of them adult males. A varying number were reported within a radius of two miles at intervals during January and February, but many details are lacking. As many as twenty-five or thirty were reported together. Two adult males were seen on May 8–9, 1934."

WENDELL P. SMITH.

Saulte Ste. Marie, Michigan

A MIGRATION STUDY OF CATBIRDS FROM 1929 TO 1934

By GEOFFREY GILL

SINCE our banding station in Huntington, Long Island, New York, began continuous operation six years ago, Catbirds (*Dumetella carolinensis*) have formed a large proportion of each year's catch. During this period we have banded four hundred and sixty of this species. An accurate analysis of these banding records is handicapped in certain respects by a lack of sufficient repeats and returns. However, by using colored bands and combining field observations with banding work, some progress has been made.

The location and description of our banding station for the years 1929 and 1930 is given elsewhere.[1] The locality was a favorable one both for nesting birds and for a concentration during the molt, as shown by the banding of one hundred and thirty-one of this species.

Our present station, operated since March, 1931, is located about two miles north of the former station, and is situated still more favorably for the capture of this species. It includes an area approximately two hundred feet by sixty-five feet, having on the east several acres of old bush-grown pasture overgrown with a tangle of weeds, maples, oaks, cedars, and wild cherry, scrub apple, and pear trees. The area is being slowly smothered by honeysuckle, poison ivy, smilax, and blackberry vines producing a tangle of briers and thickets making a miniature jungle throughout the summer months. On the north there is a small wooded valley which merges into an extensive planting of Scotch pine, now about thirteen years old. To the west and south the ground slopes into a residential section, containing considerable garden shrubbery. Given sufficient water in which to bathe and drink (supplied by our traps and every neighbor's bird-bath), and a wealth of food in the form of wild berries and insects, this area seems ideal for nesting Catbirds.

TRAPPING

Water attracts this species, white bread is eaten occasionally, and small seedless raisins are much relished. To trap a Catbird is not at all difficult, but, once one is caught, it is a hard task to capture the bird again. The following table illustrates this difficulty:

[1] *Bird-Banding*, Vol. I, 1930, pp. 185–187.

TABLE I

Year	May, June and July Adults	Individuals Repeating	Total Repeats	Percentage of Residents Repeating
1929	20	4	8	20.00
1930	10	..	..	....
1931	27	4	10	14.81
1932	35	13	38	37.14
1933	10	2	4	20.00

In 1932 colored bands were placed on the first sixty-eight Catbirds banded at this station in an attempt to get more repeats and thus aid the study of their nesting territories. Sight repeats were thereafter added to trap repeats, and it will be seen by glancing at Table I that this method greatly increased the total repeats and repeat-percentage for that year. This table, however, may contain several birds banded in May which were migrants. It is also true that some resident birds, as we have learned by using colored bands, do not enter the traps until August or September, so that one fact is perhaps balanced by the other.

Ample evidence shows that resident Catbirds confine themselves to a restricted area, for during the four seasons spent at our present banding station not one of the one hundred and forty-two Catbirds banded at the old station has been trapped at our present station.

The following data gleaned on their nesting-grounds show several aspects of Catbird migration — the percentage of birds returning (both adults and first-year birds), the order of their arrival in the spring, etc.

RETURNS–1 PERCENTAGE OF SUMMER RESIDENT BIRDS

Charles L. Whittle has published the return ratios of Catbirds banded at Cohasset, Massachusetts.[2] It is interesting to note the high percentage of returns–1. In his note two other facts stand out — the small number of new individuals banded each year and the fact that colored bands were used. Whittle says that all these birds were resident individuals nesting close to his station. For the sake of comparing my Catbird returns–1 with those of Whittle, I have properly assumed that most adults banded in May and June are residents. The following tables show a remarkable likeness:

[2] *Bulletin of the Northeastern Bird-Banding Association*, Vol. III, 1927, pp. 58 and 59.

WHITTLE

Number Banded	*Year*	*Returns–1*	*Per cent*
7	1923	2	28.57
11	1924	5	45.45
15	1925	3	20.00
19	1926	7	36.84

Average percentage:
Returns–1, 32.71.

GILL

Number Banded	*Year*	*Returns–1*	*Per cent*
7	1929	2	28.57
8	1930	..	..
23[3]	1931	7	33.33
35	1932	7	20.00

Average percentage:
Returns–1, 27.30.

At the O. L. Austin Ornithological Research Station, North Eastham, Cape Cod, Massachusetts, Catbirds were banded in considerable numbers during the seasons of 1930, 1931, and 1932. Complete records on this species, from the beginning of May to the end of October, when these birds are present, are not available for the entire three seasons, but of the birds banded in 1931, the returns–1 are available, and are as follows:

Number Banded	*Year*	*Returns–1*	*Per cent*
37	1931	10	27.02

Mr. William P. Wharton has also received some comparable returns of this species at his banding station at Groton, Massachusetts. His records are as follows:

Number Banded	*Year*	*Returns–1*	*Per cent*
14	1929	2	14.28
6	1930	1	16.66
4	1931	1	25.00
14	1932	2	14.28

Average percentage of returns – 1, 17.55

Dr. Harold B. Wood, of Harrisburg, Pennsylvania, has also done considerable Catbird banding. His comparable records follow:

Number banded	*Year*	*Returns–1*	*Per cent*
4	1929	1	26.00
4	1930	..	.... (2 birds seen
..	1931	..	wearing bands)
5[4]	1932	1	25.00

Average percentage of returns – 1, 25.00

It will be noted that the average return–1 percentage of the May and June resident Catbirds at the above five stations is almost twenty-six per cent. At these five stations a total of two hundred and thirteen resident birds are considered, three of which died soon after banding and so could not return, and twelve of this number lack the necessary data, owing in one case to the cessation of banding during the following years, and in the other case to the fact that no Catbirds entered the

[3] Two birds reported to Washington, D. C., as found dead.
[4] One bird accidently killed before migration.

traps the following year although an exceedingly high percentage of returns was known to be present. It is certain that if banding conditions had been more favorable, the average returns–1 percentage of the total returns–1 of these five stations would have been somewhat higher.

While all the residents in any area around a banding station may not be wearing bands, it is probable that not all the resident returns–1 will be seen or trapped. It is reasonable to believe that if all five stations had used colored bands on the resident birds, the return–1 percentage would average at least thirty per cent. If this is true, then it is also fair to conclude that out of the number of adult resident Catbirds banded at any station during their first two months of summer residency, only about thirty per cent will return to their place of banding.

THE CATBIRD'S ORDER OF SPRING ARRIVAL IN RELATION TO AGE

There are data indicating that the older birds either begin their spring migration earlier than the immatures, or winter farther north, or possibly travel faster from their winter home with fewer and shorter stop-overs. If spring migration is sexually induced, it is probable that the impulse comes earlier in more mature individuals. My records show that the older birds arrive first for the first Catbird captured in 1930 and 1932, and the first, second, and fourth captured in 1933 were returns–1 of resident birds and hence at least two years old.

Further evidence that, the older the bird, the sooner it arrives on its nesting-area, is found in the records of certain Catbirds that have returned for several years at Dr. Austin's station. The returns are as follows:

TABLE IV

Age	*Date of Banding*	*Returning Dates* 1931	1932	1933
Adult	Sept. 1, 1930	May 28	May 18	.....
?	Aug. 7, 1930	May 23	May 15	.....
Adult	Sept. 14, 1930	May 27	May 17	May 16
Adult	May 18, 1931	.....	May 15	May 16
Adult	May 22, 1931	.....	May 14	May 14

The above records show a fairly consistent earlier arrival of the individual bird as it grows older.

Climatic conditions would affect the dates of the arrival to a great degree, but it is doubtful whether they would affect the order of the arrivals. Improved trapping methods at banding stations from year to year will be helpful in analyzing arrival dates of banded birds.

At Dr. Austin's station there have been a surprisingly large

number of returns of Catbirds banded as birds-of-the-year in 1931 that have returned the first year after banding, so that in Table V we can compare the arrival dates of immature returns with the arrival dates of adult returns in 1932 during the same season at the same place and with the same traps.

TABLE V

RETURNS OF ADULT AND JUVENILE CATBIRDS

	May 10	11	14	15	16	17	18	19	27	*Total*
Adults	2	1	1	4	3	2	2	..	..	15
Immature	..	..	..	4	4	2	2	2	1	15

This table also shows a well-defined earlier arrival of the adults in comparison with the immature birds.[5]

RETURNS OF FIRST-YEAR BIRDS

The evidence at the four stations considered is conflicting, three reporting very few returns and one a considerable number.

Out of 179 immature birds banded prior to the 1934 season, the five returns are the only ones that have come to my attention.

At the station of Mr. William P. Wharton at Groton, Massachusetts, one nestling Catbird, banded on June 30, 1931, returned to the station on June 18, 1932. Another nestling banded on June 14, 1931, was found dead on May 26, 1932, about three quarters of a mile from the place of banding.

Dr. Harold B. Wood writes that over a period of five years Catbirds banded as nestlings gave no returns. From a total of fifty immatures banded previous to the 1933 season only one, banded by him August 26, 1929, returned.

The returns at Dr. Austin's Station have already been given. (See Table V.)

CONCLUSIONS

Approximately thirty per cent of the resident Catbirds banded during the first two months of their residence have returned again the following year to their banding-place.

---

[5] As the status of these juvenile Catbirds returning to their place of birth is not considered here in full, the Austin Ornithological Research Station was asked for further information. Mr. Seth H. Low, representing the Station, replied as follows: "In regard to Catbirds, our records show that at the time of banding the age was not always stated. However, of twenty-two designated as young birds, thirteen were captured here as returns after the 20th of May, and therefore, may be assumed to nest here; eight were taken before May 20th and so may have been either transients or breeders; and one was not caught until September. The majority, therefore, judging from the dates of capture, appear to have returned to nest here."

The presumption that the majority of these birds were on their breeding grounds is very strong since this species reaches its nesting places in Peterboro, New Hampshire, approximately eighty miles north of Cape Cod, by May 15th.—*Editor.*

Catbirds that have reached full maturity have arrived earlier than younger birds.

The data at my station thus far indicate that immature birds seldom return.

The writer wishes to acknowledge the courtesies of Mr. Charles L. Whittle, the O. L. Austin Ornithological Research Station, Mr. William P. Wharton, and Dr. Harold B. Wood, both for furnishing him with valuable banding data from their records and also for allowing him to incorporate them in this paper.

GENERAL NOTES

Bird-Banding in the Antarctic.—It may be unknown to most bird-banders that about twenty-five years ago some bird-banding was practised in the Antarctic. L. Gain, zoölogist of the Second French Antarctic Expedition (1908–1910) on the "Pourquoi Pas?" published in the report of this expedition [Deuxième Expédition Antarctique Française (1908–1910), Oiseaux Antarctiques, par L. Gain (1914)] some observations he obtained by banding two species of Penguins (*Pygoscelis adeliæ* and *papua*) and one species of Cormorant (*Phalacrocorax atriceps*).

As the results of this banding work were very interesting and most readers may not be acquainted with the original report, I quote Mr. Gain's banding notes in full:

Adélie Penguin (*Pygoscelis adeliæ*)

"At the first stay of the "Pourpuoi Pas?" at Petermann[1] Island (12 January, 1909) we put on the right tarsus of some young and adult Penguins celluloid bands colored differently, according to the age of the birds, namely violet bands on 50 adult and yellow bands on 75 young birds. In October and November 1909, when the birds were returning to the rookery, we were lucky enough to find back eleven of the adult birds banded nine months before: on November 7th we observed three Adélie Penguins and on November 22nd eight other Adélies wearing violet bands, which we had put on their right tarsus on January 12th. Possibly there were still more banded birds, but it was difficult to make out, as the birds were pecking and delivering blows with their flippers. We even observed that the banded birds made their nests on the very same rocks as last year. We did not find any yellow bands, so it appears that the young birds do not return to their birthplace and do not breed before two years old."

Gentoo Penguin (*Pygoscelis papua*)

"As with the Adélies, we desired to know if the Gentoo Penguins also return year after year to the same rookery. To learn this we banded in two different rookeries, more than two hundred kilometres away from each other, some young and adult birds with differently colored bands. At our first stay at Port Lockroy (Wiencke Island) on 28 December, 1908, we put

[1] As I was unable to locate Petermann and Wiencke Islands on any maps I have, I wrote Mr. James L. Peters for the needed information, and I quote his reply in full: "Petermann and Wiencke Islands are both small islands in the so-called Antarctic Archipelago, which is situated south of the southern tip of South America. The approximate latitude and longitude of the two little islands is Lat. 65° S, Long. 64° W. It is quite certain that the *Pygoscelis papua* found there would be the typical form."—Editor.

fifty green bands on the right tarsus of fifty adult birds; on January 12, 1909, at Petermann Island twenty brown bands on adult birds and twenty pink bands on young ones. When the birds were coming back during October and November, 1909, at Petermann Island, we found, though with much difficulty, five adult birds wearing brown bands, being twenty-five per cent of the birds marked. But I could not observe at ease the birds of this rookery, as they were very shy at my approach. It may be possible that there were other banded birds which escaped observation, even all birds had not yet returned to the rookery at the time the "Pourquoi Pas?" was leaving Petermann Island on 15 November.

"These observations prove that the same birds returned year after year to the same rookery. We could not find any bird with pink bands, which proves that the young ones do not return to the rookery before they are two years old.

"On November 26, 1909, during our too short stay at Port Lockroy, we observed, though with much difficulty, as the birds were very shy, two Gentoo Penguins wearing green bands, which we had put on eleven months before. After our return to France we learned that in the beginning of 1911 some whalers, who had left their station at Deception Island for Port Lockroy, found under the birds killed, some wearing bands we had put on December 28, 1908."

Blue-eyed Cormorant (*Phalacrocorax atriceps*)

"Desiring to learn if the same Cormorants return to their old nesting-places, as do the Penguins, we marked on 12 January, 1909, at Petermann Island these birds in the following way: three blue bands on adult Cormorants, three females who were most easily to approach, and five green bands on young birds. During our stay at Port Lockroy on 28 December, 1908, we marked ten adult Cormorants with reddish brown bands and ten young birds with pink bands. On October 7, 1909, one of the pairs nesting at Petermann Island returned to their old nest. The female bird wore a blue band on her right tarsus which we had put on on 12 January. So it is certain that the same birds return year after year to the same rookeries. During our stay at Port Lockroy (Wiencke Island) on 26 November, 1909, we observed in the same rookery nine of the ten birds banded on 28 December, 1908. We did not see enough young birds to make out if there were among them some we had banded in 1908."—Fr. Haverschmidt, Utrecht, Holland.

Sex ratio in the House Sparrow.—An interesting discussion of sex ratio in the Starling in the July (1934) *Bird-Banding* (Hicks), leads me to consider and place on record data on the sex ratio in the House Sparrow (*Passer domesticus*) at Garden City, New York. This is based on proportional counts by sight of birds about my banding station, and on birds banded, from January, 1930, through May, 1934, counts made in the seven months from November to May only, as from June to October birds in juvenal plumage occur which are indistinguishable from females.

The total counts for these months within this period amount to 7754, 4243 male and 3511 female, 55 per cent males.

Analyzing by months, we have for November, 778 males and 606 females, 56 per cent males; for December, 532 males and 404 females, 57 per cent males; for January, 420 males and 369 females, 53 per cent males; for February, 388 males and 396 females, 49 per cent males; for March, 828 males and 661 females, 56 per cent males; for April, 859 males and 628 females, 58 per cent males; and for May, 438 males and 447 females, 49 per cent males.

The total number of House Sparrows trapped and banded in these same

months (not counting young birds in May) is 229, 119 males and 110 females, 52 per cent males. The lower percentage of males here is presumably due to a disproportionately large number of males about the station already carrying bands.[1] Too few individuals are involved to give percentages satisfactory for comparison when analyzed, except perhaps for November (35 individuals), 63 per cent males; April (51), 53 per cent males, and May (83), 48 per cent males—74 per cent having been banded in these three months, leaving only 26 per cent in the other four. The curve of birds banded in these three months has a May low close to that of the counts.

I am inclined to attribute the general unbalance in the above House Sparrow figures to a somewhat greater percentage of mobility of the males toward a given point (in this case a feeding and to some extent a nesting station.) This would give any other than chance concentration of birds a higher than actual percentage of males. The monthly figures for the total counts varying from 784 in February to 1489 in March are more or less correlated with the concentration of birds at the banding station, and the four months in which these counts exceed 900 give higher percentages than for the total period, the remaining three months, lower. If we were dealing with actual sex ratios, I can think of no reasonable way whereby the males could abruptly recoup their proportion between February and March. The curve of Starling percentages (Hicks) will be seen to run rather parallel to these for the House Sparrow, though higher.—J. T. Nichols, New York, N. Y.

Herring Gull Recovery from Panama.—Among the many recoveries from a total of more than twelve hundred Herring Gulls (*Larus argentatus smithsonianus*) banded at Duck Island, Isles of Shoals, on July 20 and 25, 1933, is one of outstanding interest. This gull was banded as B611058 on the 20th, by my friend Mr. James P. Melzer. On the following December 10th, when the bird was little if any more than six months old, it was shot at Bocas del Toro, Panama.

It is of great interest to record this distant, Central America, record in connection with those unusual recoveries listed in R. J. Eaton's paper "The Migratory Movements of Certain Colonies of Herring Gulls" (*Bird-Banding*, Vol. IV, No. 4, and Vol. V, Nos. 1 and 2), which gives no recovery for this species south of Alvarado, Vera Cruz, Mexico. Under date of May 24, 1934, Mr. Frederick C. Lincoln, of the Biological Survey, could give me no record of a recovery from a location so far south. The direct air-line distance from Alvarado to Bocas del Toro is about thirteen hundred miles; but the bird may have travelled by a more or less indirect route *via* the Gulf of Mexico, coming a greater distance along the coast. On the other hand, the bird may have followed the Florida Peninsular to Cuba and flown thence to Bocas del Toro, a much shorter distance. By latitude the point of recovery is approximately seven hundred miles farther south than Alvarado.—Lewis O. Shelley, East Westmoreland, N. H.

A Few Herring Gull Recoveries.—The Austin Ornithological Research Station banded 221 juvenile Herring Gulls at Penikese Island, Massachusetts, on July 27, 1933. From these the following seven recoveries have been reported:

[1] Nichols, 1934, *Bird-Banding*, V (1), pp. 20–23.

Date of Recovery	*Band No.*	*Place of Recovery*	*Reference*	*Coast-line Distance*
10/11/33	A536756	Jones Beach, L. I.	FD	140 mi.
1/ 1/34	A530620	Sabine, Tex.	FD (?)	1680
2/25/34	A530654	Port Aransas, Tex.	C	1870
4/ 1/34	B643051	Coatzocoalcos R., near Puerto Mexico, Mexico	S	2700
4/18/34[1]	A530663	25 mi. south of Port Arthur, Tex.	...	1700
6/12/34	A530622	Hortense, Ga.	FD	950
c6/20/34	A536738	Canarsie, L. I.	FD	150

C—captured. FD—found dead. S—sick.

Considering these recoveries in the light of R. J. Eaton's recent series of articles in *Bird-Banding*,[2] it is easy to see that all but one fit not only his Atlantic population but more specifically agree with his results for Essex County and Muskeget Island, and they may be taken as additional data to confirm his ideas of the migration of Atlantic-breeding birds. The exception, A530622, may be no exception for we do not know how long it had been dead before being found.

B643051 is of especial interest because it is, I believe, the southernmost record for the occurrence of the Herring Gull. So far as I can find in the literature, the southern limits of the regular wintering range of the species are Cuba, Tampico, and the Tres Marias Islands. The bird is recorded as accidental in Jamaica and Yucatan. Occasional banded birds have been picked up at Vera Cruz, and one at Alvarado. Our recovery is certainly the farthest south for a New England banded Herring Gull. When more data have been accumulated, it may turn out, as Eaton suggests,[3] that the more southern breeders of the Atlantic population, such as birds from Muskeget or Penikese, winter farther south than those from the more northern colonies like the Isles of Shoals or the islands of Essex County.

In addition to these recoveries, we caught in a duck trap at North Eastham on February 2, 1934 a fourth year Herring Gull (386749) banded June 18, 1930 at Muskeget Island by L. B. Fletcher. This bears out Eaton's theory that no southward migration occurs after the second year.—R. M. Hinchman, North Eastham, Cape Cod, Massachusetts.

Winter Banding at Concord, New Hampshire, 1933–1934.—At my station in a little clearing in mixed woods (hemlock, white pine, beech, oak, maple, and lesser growth) during the season from November 18, 1933, to May 1, 1934, banding was carried on as usual. It is almost entirely confined to afternoon sittings, for to leave automatic traps set is not feasible. Hairy Woodpeckers (which were absent in the season of 1932–1933) were banded to the number of five, two males and three females. Of Downies, one from previous years and four new ones were caught. They were present most of the time. Chickadees were rather few—three from previous years and six new ones. It is odd that none were caught—not even repeats—after February 11th. Though they still came to exposed feed, they had perhaps learned to avoid traps. Of White-breasted Nuthatches, a pair (as supposed) spent the season. The Red-breasted Nuthatches produced only a return-1 and two new individuals; all repeated, showing that they were here for the winter. The fortuitous capture of a Winter Wren November 18th may be noticed, in a pull-string drop trap baited with canary seed and chick-feed.

---

[1] Date of letter reporting recovery.

[2] *Bird-Banding*, IV, pp. 165–176; V, pp. 1–19, 70–84.

[3] Ibid., V, p. 80.

In December four Juncos were caught. This species is rare here in winter, but one of these did stay; it occurred with Tree Sparrows, and repeated six times to February 20th. When the migrants came, thirty-three were banded—from March 26th to May 1st. It is to be noted that only once did one repeat and that was the next day, and only one other time did I set eyes on a banded bird. Last April's sixty-five Juncos supplied no visitors.

Tree Sparrows were regularly at the traps, as the winter residents have been for several years. I could trace no pairs or groups this year in their visiting of the traps together. Tree Sparrow B22148, banded February 12, 1928, returned February 7, 1929, February 18, 1932 (repeating twice), and January 20, 1934 (repeating four times); this bird is seen to be in at least its eighth year. Two Tree Sparrows in at least their seventh year also returned; one in its fifth, three in their fourth, and three in their third year. The composition of the visiting flock seemed to undergo a change before the end of February, as indicated by the almost complete cessation of repeats from returns while the traps were filled with new comers repeating. Out of the twenty banded this season, only two were first caught in March and two in April—these in association with birds that had been present since February.

Of Fox Sparrows only three were banded, contrasting with thirty-nine in the April blizzard of 1933.—Francis B. White, Concord, New Hampshire.

A Least Flycatcher Return-1.—On May 31, 1933, a female Least Flycatcher (*Empidonax minimus*) was taken in a flat trap when gathering strings and cotton for her nest situated in an elm tree thirty-five yards to the southwest. She collected a billful of cotton and string after the trap was sprung but dropped it later. She was given band number H93386.

On May 20, 1934, in the yard of a neighbor, a female Chebec occupied in gathering nest-material, and wearing a band, was noticed and watched. The nest, in the crotch of an apple tree, was completed May 22d; and on June 24th the four young were banded L57726–7–8–9, then not quite fully feathered. The following night, June 25th, the female was caught by the aid of a flashlight as she brooded the young, and her band-number ascertained. The 1934 nest-site was situated about one hundred and seventy yards from the 1933 site.—Lewis O. Shelley, East Westmoreland, New Hampshire.

A Second Pine Warbler Return.—Pine Warbler (*Dendroica p. pinus*), C52758, banded May 14, 1931, was a return-1, April 12, 1934. This bird was at least four years old. The Pine Warbler return-1 record published in *Bird-Banding*, Vol. I, p. 190, had attained an age of at least five years.—Walter B. Savary, East Wareham, Massachusetts.

Longevity of Brown Thrashers.—It seems significant that Brown Thrashers (*Toxostoma rufum*), although less numerous at my station than some other species, yet hold my two records for longevity. No. 342132, a male, was banded as an adult on June 23, 1925, and returned annually until June, 1933, when it was a return-8 and was at least nine years old. During this time he nested each season in the same trumpet vine. No. 461076, classed as a female because apparently mated in 1932 with 342132, was banded as an adult on August 19, 1926, and returned in 1929, 1930, 1931, 1932, and 1934 a return-5. This species is distinctly migratory in this western end of North Carolina. At my station, which has an elevation of 2800 feet, the birds migrate in September. I have had one recovery,

A253853, a female, killed in Pike County, Mississippi, November 26, 1931. I have also had a fall record, November 11, 1923, and this bird may have remained during the winter, though I have no further knowledge regarding it. It was here the following spring and may have remained all winter, as Pearson states that "in most parts of the state a few appear to winter." (*The Birds of North Carolina*, by T. Gilbert Pearson, C. S. Brimley, and H. H. Brimley, pages 311 and 312).—MARION A. BOGGS, R.D. 1, Waynesville, North Carolina.

Homing Instinct in the Florida Red-wing.—Last year I trapped some Red-winged Blackbirds (*Agelaius phaniceus mearnsi*) around a chicken farm, and I was asked by the owner to remove the birds from the property, as they were consuming large quantities of grain intended for the chickens. Those that I trapped I removed a distance of twelve miles and liberated, and the next day some of them were back in my traps at the chicken farm. The next day I took those that I trapped farther afield, and some of them returned. This year (1934) in a new location I continued my experiment and two males liberated at 6 P.M. twenty-three miles from where they were trapped were found back in the traps at 7 the following morning.

The following table gives the birds already retrapped at the station from which they were removed. The returns are representative of sixty-two individuals removed from site of trapping.

Date	*Band No.*	*Sex*	*Where Banded*	*Direction and Distance Removed*	*Date Retrapped*
March 27, 1933	B249177	♀	St. Petersburg, Fla.	South 12 mi.	March 28, 1933
March 27, 1933	B249178	♀	St. Petersburg, Fla.	South 12 mi.	March 28, 1933
March 28, 1933	B249178	♀	St. Petersburg, Fla.	Southwest 15 mi.	March 30, 1933
March 30, 1933	B249198	♀	St. Petersburg, Fla	North 18 mi.	April 2, 1933
April 10, 1934	B267432	♂	Oakhurst, Fla.	Southeast 23 mi.	April 11, 1934
April 10, 1934	B267446	♂	Oakhurst, Fla.	Southeast 23 mi.	April 11, 1934

—GEORGE D. ROBINSON, Jungle Manor, Saint Petersburg, Florida.

Notes on Cape Cod Crow Movements.—During the last three years (1931–1933) there have been banded at the Austin Ornithological Research Station a total of thirty-four Eastern Crows (*Corvus b. brachyrhynchos*). These birds are captured almost entirely in duck traps, which are operated only from September to June, and thus there are no records between June and late August. Although it is obvious that the data are insufficient for a clear interpretation, they suggest three crow populations on Cape Cod: first, permanent residents; second, breeding birds which winter to the south; and third, northern breeders which either winter here or migrate through here.

If the crows captured here during the latter half of April and during May are assumed to be local breeders, the following may be permanent residents.

365681 banded Oct. 9, 1932, repeated Dec. 14, 1932, killed here Apr. 27, 1933.
365682 banded Oct. 9, 1932, repeated Jan. 26, 1933, Feb. 6, 1933, Feb. 7, 1933, Mar. 6, 1933, and killed here Apr. 25, 1933.
365683 banded Oct. 9, 1932, repeated Dec. 14, 1932, May 20, 1933
365154 banded Apr. 16, 1931, returned Feb. 10, 1933, repeated Feb. 11, 1933.
365177 banded Aug. 19, 1931, returned Dec. 16, 1931, Dec. 17, 1932, repeated Feb. 16, 1933, and returned Mar. 30, 1934.
A519153 banded Mar. 27, 1931, repeated Apr. 18, 1931, Nov. 20, 1931.
A519156 banded May 15, 1931, returned Nov. 20, 1931, Apr. 2, 1932, and found with a broken wing Nov. 1, 1932 about 14 miles to the south in Harwich Center.

None of the following birds repeated during the winter, the season when the crow is most likely to enter the traps. While a lack of repeats during any period does not prove the absence of a bird, one crow was actually

taken about 215 miles to the southwest on November 1. Hence it appears that some of the local birds apparently winter to the south.

A519152 banded Mar. 25, 1931, repeated May. 16, 1931, May. 30, 1931.
A519164 banded Mar. 30, 1932, repeated Apr. 14, 1932.
A519165 banded Mar. 30, 1932, repeated Apr. 7, 1932.
A530607 banded May 20, 1933, repeated May 26, 1933.
A519167 banded Apr. 2, 1932, repeated Apr. 7, 1932, and Nov. 1, 1932 found dead at Rockaway Beach, N. Y.

Another group of five presents two possibilities. They may have been young of the year trapped before migrating south, or autumn transients, which places them in the third group. No age was given on the first bird, but the others were called adults when banded. This favors the latter grouping.

A530615 banded July 26, 1933, repeated Oct. 6, 1933.
A519953 banded Sept. 17, 1932, repeated Oct. 3, 1932, Oct. 4, 1932.
365700 banded Sept. 17, 1932, repeated Oct. 19, 1932.
A530602 banded Sept. 30, 1932, repeated Oct. 9, 1932, Oct. 17, 1932.
A530603 banded Nov. 20, 1932, repeated Nov. 26, 1932.

One autumn bird apparently wintered, but whether it came from the north or was raised locally, it is impossible to say.

A536700 banded Sept. 27, 1932, repeated Dec. 17, 1932, Feb. 6, 1933, and Feb. 7, 1933.

Our most interesting recovery may possibly be placed in the third classification:

A519168 banded Apr. 6, 1932 and reported as shot Oct. 22, 1933 at Mira, Cape Breton, Nova Scotia, over 600 miles to the northeast.

This bird was an adult at the time of banding. While the date is neither too early for it to be a breeding bird nor too late for it to be a wintering bird moving north, on the basis of the recovery the latter explanation would seem the more likely.—SETH H. LOW, North Eastham, Cape Cod, Massachusetts.

A Rose-breasted Grosbeak Returning Ratio.—At my banding station in Milford, New Hampshire, I banded sixteen Rose-breasted Grosbeaks (*Hedymeles ludovicianus*) during the nesting season of 1930, one of which was a bird-of-the-year. Of these, ten were males. This preponderance of males is believed to be due to the males having more time off the nest than the females, with the result that they visit the traps oftener and feed less hurriedly than their mates. As will be seen by the tabulation below, the following year (1931) nine of the adult birds were returns-1, seven males and two females. Of the total banded in 1930, 56.029 per cent returned in 1931, and of the adults banded 60 per cent returned. This percentage is remarkable when the great distances these birds migrate and the fact that they made the journey twice between 1930 and 1931 are taken into consideration. The record also gives perhaps a fair idea of the high survival ratio of adult birds (especially of the males), subject as they are to accidental death during their migration, and probably also to disease and predators. One hundred per cent of the females recorded returned in 1931. Details of the banding and returning dates are given below.

Band No.	*Banding Date*	*Sex*	*Age*	*Returning Date*
A222618	May 26, 1930	♀	Ad.	May 12, 1931
A222619	May 26, 1930	♂	Ad.	July 14, 1931
A222622	May 27, 1930	♂	Ad.	July 6, 1931
A222623	June 2, 1930	♂	Ad.	May 21, 1931
A222624	June 8, 1930	♀	Ad.	May 21, 1931
A222626	June 20, 1930	♂	Ad.	June 8, 1931
A222629	June 26, 1930	♂	Ad.	June 21, 1931
A222631	July 5, 1930	♂	Ad.	May 22, 1931
A222632	July 5, 1930	♂	Ad.	May 18, 1931

—JAMES P. MELZER, Milford, New Hampshire.

Breeding Birds Successful Despite *Protocalliphora*.—The fact that the parasitic fly *Protocalliphora* is so wide-spread, and in some localities is known to kill its hosts, prompts me to offer the following note and a method that has seemed to check its increase at my banding station in the past two years.

Tree Swallows, Bluebirds, and Chickadees are particularly parasited by this fly; more than one hundred fifty pupa-cases of the maggot having been taken from a single nest. They also occur in Phœbe, Red-shouldered Hawk, Red-winged Blackbird, and Robin nests, though to a much less extent. While the common feeding-hours are at night, this parasite has been found actively blood-sucking throughout the day. As many as twelve fully grown larvæ have been taken from a single juvenile Tree Swallow's head. Attacking the tarsus, the base of the bill, and the eyes of the young birds is a common practice, and they have even been found feeding on birds in the nest that had been dead four days.

My method of effecting a check is the placing, after the birds have flown, of the complete nest and refuse in a wooden box with window-screening over the top. In this manner the *Protocalliphora* emerge, but as they cannot escape through the fine wire mesh, they die. On the other hand, their small parasite *Mormoniella vitripennis*, emerging from *Protocalliphora* cases, escape to the outside and are free to affect their parasiting. I find that second and third broods have the largest percentage of *Mormoniella* among the cases of *Protocalliphora*.—Lewis O. Shelley, East Westmoreland, New Hampshire.

Additional Plumage-Color Change of an Eastern Purple Finch, B69309.—In this journal, Volume IV, page 161, I placed on record the then known variations mainly in the rump-coloration of a female Eastern Purple Finch (*Carpodacus p. purpureus*) from year to year, and discussed a suggested view that a bronzed or golden coloration assumed by some caged birds of this race was caused by something lacking in their artificial food-supply, the conclusion being reached that, whatever the cause may be in case of caged birds, the large number of wild birds with abnormal yellowish, rosy, or brownish rumps precluded the view that they were caused by the food supplied at banding stations.

B69309, when last handled in 1933, on April 5th, had a bright yellow rump-coloration which replaced the rosy rump-coloration of 1932. On August 16, 1934, B69309, after an elapsed period of approximately fifteen months, was taken again as a return-3, now at least four years and three months old, the rump-coloration having again changed, this time from bright yellow to rich dark rosy. As was the case in 1931 and 1932, the band was distinctly polished.—Charles L. Whittle, Peterboro, New Hampshire.

RECENT LITERATURE

(Reviews by Margaret M. Nice)

The articles reviewed have been selected and arranged under subjects of importance to students of the living bird and also for the purpose of suggesting problems or aspects of problems to those banders who wish to make the most of their unique opportunities.

Headings in quotation-marks are the exact titles of books or articles or literal translations of such titles. Other headings refer to general subjects or are abbreviated from titles in foreign languages. References to periodicals are given in italics.

BANDING PAPERS

"Twenty-two Years of Banding Migratory Wild Fowl at Avery Island, Louisiana."—E. A. McIlhenny. *The Auk*, LI, 328–337. This interesting paper summarizes results from banding 21,996 water-fowl of 19 species, 2116 recoveries having been reported—9.6 per cent. An impressive map shows that bands "have been returned from a territory covering the breadth of the land from the Atlantic to the Pacific Ocean, and from the Arctic to the Tropics." Homing experiments were made on a number of ducks trapped in Louisiana. Of 276 liberated on the Pacific Coast 40 were retaken in the Mississippi Valley and 9 along the Pacific Coast. Of 164 liberated on the Atlantic Coast, 30 were "retaken from the Mississippi Valley and two from the Eastern Route, showing that the great majority of the birds sent out of their home range return to the migration route from which they were taken."

One of the most unusual returns was that of a Pintail (*Dafila acuta tzitzihoa*), banded at Avery Island February 14, 1930, liberated on the Potomac River near Washington, D. C., and killed in California, November 2, 1932.

Three birds lived to be at least ten years old—a female Lesser Scaup (*Nyroca affinis*), a male Ring-neck (*Nyroca collaris*), and a Louisiana Heron (*Hydranassa tricolor ruficollis*).

As to sex ratio, McIlhenny has found a great preponderance of males, the ratio of males to females being as follows in five species: in 6159 Lesser Scaup, $2\frac{1}{2}$:1; in 7067 Pintails, $1\frac{2}{3}$:1; in 913 Ring-necks, $4\frac{1}{2}$:1; in 992 Blue-winged Teal (*Querquedula discors*), $4\frac{1}{5}$:1; and in 461 Canvasbacks (*Marila valisineria*), $4\frac{1}{2}$:1.

The Sex Ratio of Ducks during winter and spring in Germany is discussed by H. Frieling,[1] the observations being based on censuses of flocks. Although in the total counts males predominated, the author believes this is due to differing migrating habits of the sexes. For instance, with the Tufted Duck (*Nyroca fuligula*) and Common Pochard (*Nyroca f. ferina*) the drakes migrate farther south than their mates, then pass rapidly north to the breeding grounds in March, while the female ducks remain in Germany throughout the winter and into April. With the Golden-eye (*Bucephala-Glaucionatta c. clangula*) also more ducks winter there than drakes.

[1] Statistische Untersuchungen über das Geschlechtsverhältnis der Enten zur Zugzeit. 1934. *Der Vogelzug*, v, 109–115.

"The Migration of the Song Thrush (*Turdus ph. philomelos Brehm*)".[2] Three maps show 392 recoveries of Song Thrushes ringed in Germany, their winter quarters being southwestern France, Spain, and Algiers. "A large number of finds prove that young Song Thrushes return the next year to the vicinity of their birthplace". In two different cases two young of the same brood were recovered in the same place in their winter quarters. Among the 451 records of returns and recoveries there are seven cases of birds four years old and one of five and a half. The ring of a young thrush was found in the stomach of a Hooded Crow (*Corvus cornix*), while many birds were killed by cats.

"The Migration of the Scandinavian Lesser Black-backed Gull (*Larus f. fuscus*)."[3] In this valuable paper Dr. Schüz concludes: "The Lesser Black-backed Gull is an example of a bird that migrates very far south without being forced to do so through feeding requirements. This is evident from the large numbers that remain in the north. One cannot ascribe this failure to migrate to a diseased condition. But even if one does, there remains the fact of tremendously extensive winter quarters, for the journey can end at the Black Sea or in the heart of Africa. A bird of such differing behavior offers an important key for the study of histological and physiological conditions of the migratory instinct."

Recoveries of Black-headed Gulls in Relation to Birthplace.[4] Gulls in their second summer were retaken both near their birthplaces and two thousand kilometers away, but in the third summer all but one record fell within one hundred kilometers of the home colony. As evidence of return to winter quarters, cases are given of eight birds taken at Kiel and recaptured there the following year.

"Research on Bird Migration at Heligoland."[5]—This brief résumé of migration research as carried out at Heligoland is illustrated with pictures of the great garden trap, of activity cages, and of the efficient methods of weighing, measuring, and ringing the birds, as well as with maps of recoveries of Guillemots and Redstarts.

Speed of Migration.—An adult male Blackcap banded in Schlesien August 30th was captured September 10th in Cyprus—a distance of 1320 miles in ten days.[6] Lesser Black-backed Gulls averaged 32, 38, and 97 miles a day by air-line—the last for a journey of thirteen days.[3]

Banding in Hungary.—The Hungarians are doing valuable work in banding, some of which has already been reviewed in *Bird-Banding* (iv, 1933, 117–118). In the first[7] of the three papers by Jakob Schenk under

[2] Vom Zuge der Singdrossel (*Turdus ph. philomelos* Brehm). W. Eichler. 1934. *Der Vogelzug*, v, 135–143.

[3] Vom Zug der schwarzrückigen Heringsmöwen (*Larus f. fuscus*). E. Schüz. 1934. *Der Vogelzug*, v, 123–134.

[4] Ueber Heimatgebundenheit und Ortstreue ostholsteinischer Lachmöwen, *Larus r. ridibundus* L. B. Resühr und W. Albertsen. 1934. *Der Vogelzug*, v, 144–174.

[5] Vogelzugsforschung auf Helgoland. R. Drost. 1934. *Natur und Volk*, lxiv, 152–158.

[6] Mönchgrasmücke (*Sylvia atricapilla* L.) zieht 2200 km in 10 Tagen. W. Trettau. 1934. *Der Vogelzug*, v, 150.

[7] Die Vogelberingungen in Ungarn in den Jahren 1926–27. 1927–1928 *Aquila*, 34–35, 53–85.

consideration, there is a record of a Redshank (*Totanus calidris*) fifteen years old and a Purple Heron (*Ardea purpurea*) sixteen years old. Some nestling Swallows (*Hirundo rustica*) return home, but one was found two years later nesting eleven miles from its birthplace. The Great Titmouse (*Parus major*) is sedentary; two males and a female nested in the same place three years in succession, each bird remating a second year with a former mate. With the Marsh Titmouse (*Parus palustris*) some of the young return to their birthplace to nest. Interesting studies were made by Koloman Warga on the Common Redstart (*Phœnicurus phœnicurus*); he found that both old and young returned to his garden to breed. One male nested for three years, having the same mate during the last two years. Another male had two mates at the same time.

Ringing statistics[8] covering twenty-five years were collected from European countries, particularly Germany, Denmark, and England, with the view to ascertaining whether or not birds return to their homes. Fourteen hundred records involving forty species are dealt with; these all fall within the breeding season, but unfortunately no distinction is made between birds ringed as adults and those ringed as young. Eighty per cent of the birds were taken within six miles of home, 10 per cent between six and thirty miles, 3½ per cent between thirty and sixty miles, and 3½ per cent over sixty miles. The species that showed the highest percentages of dispersal were the Hawks, Storks, and Black-headed Gulls. These are all species that do not breed during their second summer; so it is probable that most of the recoveries were of young, non-breeding birds.

The last paper[9] is a fascinating account of banding in a Hungarian Puszta—a great, uncultivated, treeless plain, inhabited by herds of cattle and large numbers of Waders, Ducks, Skylarks, and many other birds. Dr. Schenk captures the parent birds of a number of species—particularly Lapwings—by means of nets placed over the eggs. It is sad to learn that through reclamation projects this "immemorial paradise of all the wading and water birds" will soon be destroyed.

MIGRATION THEORIES

"Remarks on the Genetics of Bird Migration."[10]—Further details are given here concerning the Mallards (*Anas p. platyrhynchos*) hatched in Finland from English eggs (see *Bird-Banding*, v, 95): ten per cent of the ducks banded in 1931 returned in 1933 to the place of banding; neither in 1931 nor 1933 did their fall migration appear to have been stimulated by unfavorable weather conditions. The authors discuss the matter as to how much of the migratory "drive" is inborn and how much is due to environmental factors. They want Valikangas' experiments repeated "under most careful observation of date of departure, social relationships and meteorological conditions. Also Finnish ducks should be brought to England, and if possible placed in ponds without other ducks." Typical migrating birds should also be experimented with, Storks, for instance.

---

[8] Die Siedlungsverhältnisse einiger Vögel der paläarktischen Fauna 1929. Xe Cong. Int. Zool. Budepest, 1927. 1386–1401.

[9] Ornithological Excursions in a Hungarian Puszta. 1932. *The Oologists' Record*, xii, 25–36.

[10] Bemerkungen zur Genetik des Vogelzuges. H. Frieling, J. Valikangas und der Schriftleitung. 1934. *Der Vogelzug*, v, 120–122.

"On the Causes of the Fall Migration Direction."[11]—The Vogelwarte of Heligoland discusses various theories as to what determines the direction of the autumn migration, stating that the idea of an inherited sense of direction is now widely accepted. Although agreeing that this appears to be the only explanation in some cases, the author believes that many migratory birds in the fall are attracted by warm air-currents, *i.e.* they have the instinct to go toward warmer regions.

ECOLOGY

Important bird papers are appearing in *The Journal of Animal Ecology*, edited by Charles Elton and A. D. Middleton,[12] particularly concerned with ecology and the closely related subject of censuses. Since its inception in 1932 there have been five long articles on bird-ecology and seven long ones dealing with bird-counts, besides several short notes on birds. Limitations of space forbid reviewing more than a few of these.

"A Contribution to Tropical African Bird-Ecology."—R. E. Moreau. 1934. *J. Animal Ecology*, 3, 41–69. A critical discussion of the multitudinous environmental factors influencing bird-distribution—altitude, biotic, climatic, and subjective factors, and eco-climates, *i.e.* "the sum-total of meteorological factors within a habitat." The author emphasizes the great complexity of the various problems. As to temperature, he suggests "that the mean maxima of the hottest months and the mean minima of the coldest are at least likely to be more illuminating than the annual mean temperatures, or even the annual mean maxima and minima." (Page 58.) In discussing general climatic factors he states "temperature and humidity are the factors that in combination primarily determine vegetation types, and, generally speaking, the vegetation type determines the light." (Page 59.) As to eco-climates, differences in temperature between the bare ground and in deep foliage may be as great as 10° C. within a distance of six feet! "That is equivalent to the difference involved in more than 5000 feet of altitude." (Page 63.)

In tropical forests, "competition as a direct biotic factor is not likely to be of much weight," since there is a superabundance of fruit, and "coöperation in the pursuit of insect food in great measure replaces competition." (Pages 48, 49.) This important paper deserves careful study by all those seriously interested in the study of the relation of the bird to its environment.

David Lack has recently contributed three papers to the subject of bird ecology. The first[13] is an interesting study of the succession of nesting species in the young pines; the author emphasizes the subjective factor of preference for certain kinds of habitats. In his study of Icelandic birds[14] he states: "Food is at times the factor limiting distribution." "Among the Passerines and sea-birds, selection of a particular type of nesting-site frequently limits their distribution. This restriction is usually only psychological, and, though normally fixed, is found to be overridden when there are

[11] Uber die Ursachen der Herbstzugrichtungen. R. Drost. 1934. *Berichte des Vereins Schlesischer Ornithologen*, xix, 1–9.

[12] London, Cambridge Univ. Press, Fetter Lane, E. C. 4.

[13] Habitat Selection in Birds with Special Reference to the Effects of Afforestation in the Breckland Avifauna. 1933. *J. Animal Ecology*, ii, 239–259.

[14] Habitat Distribution in Certain Icelandic Birds. 1934. *Ibid.*, iii, 81–90.

more birds present than the typical sites can provide for." "Finally, though it often seems to be assumed that the breeding population of birds is at the optimum or maximum permitted by food, this has never been proved for any natural habitat."

Arctic Terns (*Sterna paradisæa*) on lakes less than two miles apart started nesting at decidedly different times, corresponding to the dates at which their nesting-grounds became available.[15] Lack quotes similar instances with Cormorants, Australian Pelicans, and several African species, also stating that in the Arctic "there is wide-spread non-breeding in a late summer." He concludes that "though laying is primarily dependent on the state of the gonads, it is immediately controlled by the nervous system, through which nesting conditions, sudden cold, and perhaps other factors can limit breeding."

Effects of Drought Upon Breeding are reported by W. Hoesch,[16] who states that under these conditions in southwest Africa many species fail to breed at all, others leave the stricken area, a few build nests but do not lay, while some birds are unaffected. In the first category are a Francolin, Doves, a Turoco, Crowned Lapwing Plover, four species of Weaverbirds, and all species of *Passer*, while in the last are Woodpeckers, Goatsuckers, Shrikes, Bulbuls, and Thrushes.

CENSUSES

The close connection between ecology and bird-counts is shown by O. Meylan's paper[17] on the number of species and individuals in typical habitats in Switzerland. The author employs a new method of indicating the numbers of pairs present, namely by a "coefficient of abundance" representing the number of pairs to a square kilometer: 1 = rare, less than a pair; 2 = uncommon, about one pair; 3 = rather common, two to five pairs; 4 = common, six to twenty pairs; and 5 = abundant, more than twenty pairs. This is suggestive, perhaps, for a rough survey of a wide region, but the great range in the significance of items 4 and 5 makes it inapplicable for careful censuses.

Counts of Nesting Raptores.[18]—The abundance of Raptores in northern Germany is strikingly shown in these censuses of wooded areas in the Mark Brandenburg since 1929. In a region of ten square kilometers from seventeen to twenty pairs of eight species of hawks have nested each year since 1929, and in another of seven square kilometers fourteen to fifteen pairs of nine species have nested. The number has remained practically unchanged from year to year, the birds returning to their homes with great faithfulness.

[15] Nesting Conditions as a Factor Controlling Breeding Time in Birds. 1933. *Proc. Zool. Soc.*, 231–237.

[16] Nester und Gelege aus dem Damaraland. I. 1934. *Jour. f. Ornithologie*, lxxxii, 325–339.

[17] Les Cèvennes et le Massif central. Contribution à l'ètude avifaunistique d'une règion montagneuse. 1934. *Arch. suisses d'Ornith.* i, 113–140.

[18] Fünf-und sechs jähriger Beobachtungen über die Raubvögel zweier norddeutscher Waldgebiete (mit Berücksichtigung ihrer Siedlungsdichte). V. Wendland. 1934. *Beitr. z. Fortpflb. d. Vögel*, x, 130–138.

A disheartening picture, on the other hand, is shown by an automobile census of hawks in this country,[19] where over a distance of 6858 miles only 53 hawks were seen.

White Storks[20] have greatly increased since 1928 in Oberschlesien and other regions in the eastern part of their range, although steadily decreasing in the west. The weather during the breeding season through its effect on the food-supply has a great influence on the numbers of young raised. Stork censuses have proved a fine means of interesting people in the protection of these splendid birds.

"Bird Population Studies: a Preliminary Analysis of the Gold Coast Avifauna."—J. M. Winterbottom. 1933. *J. Animal Ecology*, ii, 82–97. Interesting analyses of counts from train and automobile, and also of "sample censuses," *i.e.* the numbers of birds heard from a particular point during a stated period of time. The author compares the wealth of Raptores on the Gold Coast with their paucity in England.

LONGEVITY

"Wren-Tit Banded in 1925 Again Trapped."—E. L. Sumner, Sr., 1934. *The Condor*, xxxvi, 170. The Gambel's Wren-Tit (*Chamæa f. fasciata*) mentioned in the January number of *Bird-Banding*, p. 52, banded March 25, 1925, has been recaptured February 21, 1934, and so must be nearly ten years old and perhaps older.

"Recoveries of Marked Birds," *Brit. Birds*, 1934, xxviii, 36–48, gives a number of longevity records of interest: Blackbirds (*Turdus merula*) of five, six, and nearly eight years, a Yellow Bunting (*Emberiza citrinella*) of eight and one-half years, and Starlings (*Sturnus vulgaris*) of six and nine years.

A male Cardinal (*Richmondena c. cardinalis*) believed to be at least eight years of age[21] has been in the Gillespies' yard "practically every day for over six years." "He is by far the finest singer of all the numerous Cardinals in the vicinity."

Other records of longevity will be found under "Banding Papers" in McIlhenny's article, and also in [2] and [7].

WEIGHT

"Winter Weights of Golden-crowned and Fox Sparrows."—J. M. Linsdale and E. L. Sumner, Sr., 1934. *The Condor*, xxxvi, 107–112. This is a continuation of the work reviewed in the July number of *Bird-Banding*, page 142, which was concerned with four captive Golden-crowned Sparrows; the present paper deals with wild birds trapped during the winter and

[19] A Hawk Census from Arizona to Massachusetts. M. M. Nice. 1934. *Wilson Bulletin*, xlvi, 93–95.

[20] Die Veränderungen im Bestande des Weissen Storches (*Ciconia ciconia*) in Oberschlesien. M. Brinkmann. 1934. *Jour. f. Ornithologie*, lxxxii, 420–434.

[21] Banders Can Easily Specialize on Longevity Problems. J. A. Gillespie. 1934. *Eastern Bird Banding Quarterly*, i, 8–9.

spring, 1422 records having been obtained on 286 *Zonotrichia coronata* and 711 records of 91 *Passerella iliaca*. "Both species reached one peak in weight in mid-winter and another, considerably higher one just before the spring migration. Supplementary records . . . indicate that high weight is maintained until arrival on the breeding grounds." "The seasonal changes are, we think, mainly the rhythm of the internal changes in the bird's metabolic activities which accompany the rhythm of the breeding cycle, including migration. But there is also weight change which is sometimes great and which comes from external influences."

LIFE-HISTORY STUDIES

The Nest Life of the Night Heron.[22]—Hungary has been a wonderful nesting-place for thousands of water-birds, but now most of the swamps have been drained, and Hungarian nature-lovers must act quickly if even a remnant of the former glories is to be saved. The present paper is the result of three seasons' study of the bird-life in the Kis Balaton. With the Night Heron the nest is the bond between the mates, who pay no attention to each other away from it. When incubating, they change places every two to three hours (more or less), depending on hunting success. At the age of one week the young defend themselves from strangers, later attacking their nest-mates returning home from short flights and even their own parents. At the age of three to four weeks they begin to make little expeditions from the nest and try to capture broken twigs or bits of reeds, sometimes succeeding in getting water-beetles or leeches. At about six weeks they go out with companions to the feeding-grounds and there gradually learn by further experiment to feed themselves, becoming independent at eight weeks.

Incubation Rhythm in the Lesser White-Throat.[23]—A male and female *Sylvia c. curraca* relieved each other very regularly every seven minutes—the shortest period with which the reviewer is acquainted. On one occasion, when the male stayed away a little longer, his mate looked about, hopped on the nest-rim, and called.

The Biology of the Inca Dove.[24]—In Mexico City this little dove breeds from October to July. The male incubates from 11 A.M. to 3 P.M.—a shorter period than with most doves; the incubation period is eighteen to nineteen days, while the fledging period lasts fourteen to fifteen days, in one case seventeen.

Nesting Studies on the Willow Grouse (*Lagopus lagopus*).[25]—In this Norwegian pamphlet with an English summary records are given on one

---

[22] Ein Beitrag zur Kenntnis der Naturgeschichte, insbesondere des Brutlebens des Nachtreihers, *Nycticorax n. nycticorax*. O. Steinfatt. 1934. *Beiträge zur Fortpflanzungsbiologie der Vögel*, X, 85–96.

[23] Zähmungsversuch an der Zaungrasmücke. A. Löpmann. 1934. Baiträge zur Fortpflanzungs biologie der Vögel X, 96-98.

[24] Zu den Lebensgewohnheiten von *Scardafella i. inca* (Lesson) in Mexiko. F. Heilfurth. 1934. *Ornithologische Monatsberichte*, xlii, 103–110.

[25] Undersokelser over Lirypens Forplantningsforhold. O. Olstad. 1932. Statens Viltundersokelser, Meddelelse nr. 1. 1–71. Oslo.

hundred and twenty-five nests found over a period of nine years. By means of banding this species has been found to be "extremely stationary," and "the individual birds appear in the main to occupy the same tract of land spring after spring." "In all cases examined the nest has been fashioned after the first egg has been laid." "In one case where all the eggs of a hen were sterile, the bird continued sitting long after the usual number of days necessary for hatching had passed." In 38 per cent of the nests all the eggs hatched, in 25 per cent some hatched, while in 37 per cent none hatched. Of 1068 eggs, 687 hatched—64.3 per cent. The chief enemy is the Hooded Crow, which destroyed from 16 to 26 per cent of the eggs.

TERRITORY

"The Breeding-habits of the Corn-Bunting as Observed in North Cornwall: with Special Reference to its Polygamous Habit."—Lieut.-Col. and Mrs. B. H. Ryves. 1934. *Brit. Birds*, xxviii, 2–26. A very interesting detailed study on twenty-four males and forty-five females of *Emberiza c. calandra*, the birds being distinguished by position and not by bands. Many of the males occupied "tracts of suitable territory in close proximity to each other, and yet each holding a very distinct 'individual territory'. The distance between the 'pitches' of any two such males varied between about 45 to 180 yards."

About the middle of May the males "take possession of a suitable territory, hold it against all comers and advertise themselves by constant singing." The singing perch may be anywhere "from 20 to 100 yards or even more" from the nest, but it must "command a view of the nest site." "Where a male has more than one mate and the lie of the country is such that no one perch will command all the nests, he will so place himself as to command at least one nest and the route or routes to the feeding grounds of his other hen or hens."

The nest is built by the hen in one or two days, and laying usually starts after one day's interval. "The hen usually spends some hours in site-selection and is closely accompanied by the male, which frequently perches near her and indulges in vigorous bursts of song, scoldings and wing-quiverings." The female alone incubates, staying on the nest from forty to ninety minutes and off it from fifteen to forty minutes. When she leaves, the male stops his song and follows her "to her feeding ground, which is almost always a long way off (600 yards or possibly more), and escorts her back, watching her down to her nest from his perch." "Rarely, he calls her off her eggs with a low '*zip*', and then accompanies her to her meal." If she is reluctant to return, her "mate will flutter to a perch close to her, stretch out his body and with quivering wings and lowered head, scold her" with a raucous note.

"The indefatigable hen, practically alone, undertakes the work of rearing the young," although when "the nestlings have attained a fair size, the male is occasionally seized with a fit of energy and helps the hen for a short spell which rarely exceeds half an hour. During this short burst of activity he works really hard and we have recorded 20 visits paid in thirty minutes. Whereas the hen goes far afield for food, the male, oddly enough, finds grubs close at hand."

From three to five eggs are laid in a set, and some, but not all the hens raise two broods. Two hundred and nineteen eggs were laid in 53 nests and 126 young were fledged—58 per cent of success. Fifteen of the twenty-four males were polygamous, four of them having three mates and one four!

"The relationship between the hens owned by one male is one of amity. There appears to be no jealousy, even when the male, at certain times, shows marked favouritism." Only once did the authors observe a male attack a neighbor's mate. The males often desert their mates the middle of August, while the latter "rear their nestlings unwatched and unhelped."

Although the nests are placed within the male's territory, feeding takes place at an astonishing distance, hence territory with these Corn Buntings seems to be something intermediate between the nest-territory of colonial birds and the typical territory of Reed Buntings, Redbreasts, Song Sparrows, many Warblers (both Old World and New), etc. These territories can have no food value, but the male's preoccupation with watching his mates makes it appear as if territory with these birds were largely conditioned by sex jealousy.

"Notes on Territory in the Dartford Warbler."—L. S. V. Venables. 1934. *British Birds*, xxviii, 58–63. Thirty-nine pairs of *Sylvia undata dartfordiensis* nested on about one thousand acres in Surrey. The author says that if his observations had been confined to places where the pairs nested about two hundred yards apart he "might well have considered that the bird was strictly territorial, that this territory was used as a feeding area and that territorial behaviour set a limit to the density of the breeding population. But these conclusions are completely invalidated by the observations made where the birds were thickly distributed." . . . "If one may term the 'anxiety area' and the feeding area a territory, the territories are not compressed when the birds are thickly distributed. Instead, they remain about the same size, but are shared, apparently without any friction, between two or three pairs."

The author concludes: "It is clear that in the Dartford Warbler, territory does not limit the population density and does not restrict the feeding area. Perhaps, therefore, the species should not be termed territorial."

These two papers show the great complexity of the problem of territory—the Corn Bunting with its intermediate type that does not seem to have been described before, and the Dartford Warblers that are so friendly together. The study of territory is plainly a limitless field.

BIRD BEHAVIOR

"Rambles through the Worlds of Animals and Men."[26]—An exceedingly interesting introduction to animal psychology in simple language with a wealth of illustrations. We discover how the world looks to a fly, a periwinkle, and a paramecium, and we learn of territory defense in sticklebacks and moles, dogs and bears. The hen's reactions to the sight and sound of her chicks are analyzed, and the problem of the "known path" is discussed—both the route learned through experience and the inborn one of many migratory birds. In order to understand bird behavior one must know something of the psychology of other animals, and this little book offers us some fundamentals.

"The Social Order in Flocks of the Common Chicken and the Pigeon."—R. H. Masure and W. C. Allee. 1934. *The Auk*, li, 306–337.

[26] Streifzüge durch die Umwelten von Tieren und Menschen. J. v. Uexküll und. G. Krizsat. 1934. Berlin, Springer. 102 p. RM 4.80.

This careful, detailed study supports the work of Schjelderup-Ebbe in most respects with the Chickens, but a much less definite organization was found with Pigeons, where the social order "was based on peck-dominance worked out after many contacts rather than upon an initial combat with one member of any given contact-pair regularly dominant thereafter. The latter relationship is characteristic for Chickens."

COÖPERATIVE ORNITHOLOGY

Two fine starts in this direction have been made, one in eastern North America and the other on the West Coast. A new journal, the *Eastern Bird Banding Quarterly*,[27] has been started as a medium of exchange of experiences between the 422 banders in the Eastern Bird-Banding Association The importance of stimulating interest in banding in the South is stressed; information is asked in regard to recoveries of Ospreys, and the habits of Turkey Vultures, while the first definite project planned is a study of the White-throated Sparrow.

Inder the caption "Help Wanted, Ornithological" the able editor of *News from the Bird-Banders* (1934, 27–30) states, "The scientific results of bird-banding, and the interest of all ornithologists in this work, would be greatly enhanced were there more coöperation both between banders, and between banders and other people who work with birds." He then mentions fourteen persons and the special problems on which they are working and on which they would like information from other students. Most of the questions asked are both specific and suggestive.

The Vogelwarte of Rossitten and Heligoland (July *Vogelzug*) are asking coöperators to turn their attention to the number of broods raised by Starlings: in eastern and northern Europe this species raises but one brood, in the west and south two. How do the birds in intermediate regions behave?

REFERENCES AND ABSTRACTS

Ornithologische Monatsberichte[28] is publishing a useful list of current articles on birds in non-ornithological journals, omitting Parasitology, Pathology, Migration, and Breeding-Biology, but including among more technical subjects the topics of Heredity, Physiology, Food, Psychology, and Ecology. This is to be a regular feature appearing three times a year.

In the *Journal of Animal Ecology* the British literature on the subject is abstracted, and a duplicate set of these notices supplied, conveniently arranged for pasting on to five-inch index cards. These can be obtained separately for 3s.6d a year for about two hundred notices.

[27] Editor, W. Batezel, 139 E. Wayne Terrace, Collingswood, N. J.

[28] Editor, E. Stresemann, Berlin N. 4, Invalidenstr. 43.